THE LIBRARY OF CONGRESS

IC 8926

Bureau of Mines Information Circular/1983

LIBRARY OF
4
JUN - 1 1983.
EXCHANGE & GIFT

Minerals Availability Commodity Directory on Phosphate

By Dale R. Spangenberg, Edward F. Carey,
and Paula M. Takosky

UNITED STATES DEPARTMENT OF THE INTERIOR

(United States, Bureau of Mines)

Information Circular 8926

Minerals Availability Commodity Directory on Phosphate

By Dale R. Spangenberg, Edward F. Carey,
and Paula M. Takosky

UNITED STATES DEPARTMENT OF THE INTERIOR
James G. Watt, Secretary

BUREAU OF MINES
Robert C. Horton, Director

TN295
.U4
no.8926

This publication has been cataloged as follows:

Spangenberg, Dale R

Minerals availability commodity directory on phosphate.

(Bureau of Mines information circular ; 8926)

Supt. of Docs. no.: I 28.27:8926.

1. Phosphates. I. Carey, Edward F. II. Takosky, Paula M. III. Title. IV. Series: Information circular (United States. Bureau of Mines) ; 8926.

TN295.U4 [TN913] 622s [553.6'4] 83-600002

CONTENTS

	Page
Abstract	1
Introduction	2
Acknowledgments	2
Organization of directory abstracts	3
Deposit abstracts	5
Domestic deposits	5
Florida	5
Georgia	220
Idaho	224
Montana	293
North Carolina	298
South Carolina	307
Tennessee	311
Utah	327
Wyoming	367
Foreign deposits	414
Algeria	414
Angola	417
Australia	419
Brazil	438
Canada	468
China	470
Colombia	491
Egypt	494
Finland	507
India	512
Iraq	515
Israel	518
Jordan	528
Mexico	536
Morocco	543
Nauru	573
Pakistan	576
Peru	578
Saudi Arabia	580
Senegal	584
South Africa	590
Syria	593
Togo	600
Tunisia	605
Turkey	622
U.S.S.R.	625
Venezuela	660
Western Sahara	663
Zimbabwe	666
Appendix A.--Alphabetical listing of abstracts by deposit name	669
Appendix B.--Listing of abstract data sets, subsets, and data elements	674

TABLES

1. State totals of domestic deposits	3
2. Country totals of foreign deposits	3

MINERALS AVAILABILITY COMMODITY DIRECTORY ON PHOSPHATE

By Dale R. Spangenberg,[1] Edward F. Carey,[2] and Paula M. Takosky[3]

ABSTRACT

This Bureau of Mines Information Circular on phosphate is one of a series of minerals availability commodity directories. Nonconfidential information from the Minerals Availability Program data base covering 148 domestic and 103 foreign phosphate properties and deposits has been abstracted for use in this directory. Abstracts include applicable data on location, published reserves and resources, geology, mine and beneficiation systems, and operational information.

[1]Physical scientist, Eastern Field Operations Center, Bureau of Mines, Pittsburgh, Pa.

[2]Geologist, Eastern Field Operations Center, Bureau of Mines, Pittsburgh, Pa.

[3]Mining engineer, Eastern Field Operations Center, Bureau of Mines, Pittsburgh, Pa.

INTRODUCTION

This publication is one of a series of commodity directories from the Bureau of Mines Minerals Availability Program. The directory is intended to provide Government personnel and the general public with site-specific information on major identified domestic and foreign phosphate properties and deposits. It is a compilation of nonproprietary deposit information abstracted from the Minerals Availability Program data base. Included in the abstracts are locational information, published reserve and resource estimations, geological descriptions, mine and beneficiation systems, and actual or estimated operational parameters.

The Bureau of Mines Minerals Availability Program conducts engineering and economic availability appraisals of nonfuel mineral commodities. These appraisals are made after systematic resource and engineering-cost evaluations of site-specific deposits have been conducted and the data entered into the Minerals Availability Program data base. Deposits are chosen for evaluation based on their contribution or potential to significantly contribute to the overall availability of a commodity.

The reserve and resource data presented in this report are restricted to information on specific deposits, or aggregated deposits, obtained from published sources. Minerals availability assessments on reserve and resource data often are based on information provided by mining firms as company confidential data which cannot be presented in non-aggregated form. The published data presented herein are included to provide some information on reserve and resource potentials for given deposits, or aggregated deposits. These values may not represent the most current information being utilized in the Bureau's analysis or the amount of reserve at a given property.

The comparison of reserve and resource information as presented in this report and other Minerals Availability Program reports with estimates from other sources, on either a specific property, aggregated properties, or commodity basis, may show differences in estimates. Differences may be due to variations in terminology, changes in estimates of reserve and resource data over time, and the source of the estimates. Factors affecting such changes include the number of deposits considered, changes in economic conditions, additional exploration efforts, and depletion of ore due to production. These factors may account for discrepancies in the amount of reserves and resources being compared.

Additional information on the Minerals Availability Program appears in Information Circular 8887, "The Bureau of Mines Minerals Availability System: An Update of Information Circular 8654."

ACKNOWLEDGMENTS

Compilation of the phosphate directory was supported by the Minerals Availability Program staff at the Eastern Field Operations Center, Pittsburgh, Pa., and coordinated through the Division of Minerals Availability, Washington, D.C. The deposit evaluations included in the Minerals Availabilty Program data base, from which information for this directory was abstracted, were completed by evaluators at the Eastern Field Operations Center, Pittsburgh, Pa., Intermountain Field Operations Center, Denver, Colo., Western Field Operations Center, Spokane, Wash., and Minerals Availability Field Office, Denver, Colo.

ORGANIZATION OF DIRECTORY ABSTRACTS

The Directory is divided into domestic and foreign sections. Domestic deposits are listed alphabetically by State and county; foreign deposits are listed by country and political subdivision. Within each country or political subdivision, deposits are listed by Minerals Availability Program sequence number.[4] The number of domestic deposits is summarized in table 1, and the number of foreign deposits in table 2.

TABLE 1. - State totals of domestic deposits

	Number of deposits		Number of deposits
Florida	97	South Carolina	2
Georgia	2	Tennessee	6
Idaho	17	Utah	8
Montana	2	Wyoming	10
North Carolina	4	Total	148

TABLE 2. - Country totals of foreign deposits

	Number of deposits		Number of deposits
Algeria	1	Nauru	1
Angola	1	Pakistan	1
Australia	8	Peru	1
Brazil	11	Saudi Arabia	2
Canada	1	Senegal	2
China	11	South Africa	1
Colombia	1	Syria	3
Egypt	6	Togo	2
Finland	2	Tunisia	7
India	1	Turkey	1
Iraq	1	U.S.S.R.	13
Israel	4	Venezuela	1
Jordan	3	Western Sahara	1
Mexico	3	Zimbabwe	1
Morocco	12	Total	103

[4]The sequence number is a unique 10-digit reference number assigned to each deposit. For domestic deposits, the first three digits designate the State, the next three digits designate the county, and the last four digits designate a number unique to each deposit within that State and county. For foreign deposits, the first three digits designate the nation, the next three digits designate the political subdivision, and the last four digits designate a number unique to each deposit within that nation and political subdivision.

Each deposit abstract consists of six data sets. These are listed below in the order in which they appear within an abstract.

1. Location and general deposit information.

2. Published reserve and resource information.

3. Deposit historical information.

4. Geological and spatial characteristics of deposit.

5. Mine and mill information.

6. Bibliographic records.

Each abstract is composed of screened data elements of an individual deposit selected from the Minerals Availability Program data base. Proprietary data elements have been omitted from this directory. Because of the limited amount of published reserve information on individual domestic phosphate deposits, aggregated reserve and resource information has been included for domestic deposits, on a broader area basis. Mine and mill operational information is included only for phosphate deposits that are currently producing or temporarily shut down. The date the information was obtained is included in each deposit abstract. Metric units are used throughout the abstract listings in this directory.

Two appendixes are included as an aid in directory use. Appendix A presents an alphabetical listing of abstracts by deposit name. Appendix B presents a listing of abstract data sets, subsets, and data elements that may appear in the abstracts; terms with usage particular to this directory are defined in brackets.

DEPOSIT ABSTRACTS

DOMESTIC DEPOSITS

FLORIDA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: PIRKLE DEPOSIT 1
SEQUENCE NUMBER: 0120010001

NATION: USA STATE: FLORIDA
COUNTY: ALACHUA
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 29 DEG 41 MIN 49 SEC
LONGITUDE: W 82 DEG 18 MIN 11 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3285736 EASTING: 373935
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 54 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
OWENS-ILLINOIS CORPORATION	OWNER
CONCORA CORPORATION	OWNER
NUMEROUS SMALL OWNERSHIPS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB296 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1956

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

PIRKLE, E.C., JR. PEBBLE PHOSPHATE OF ALACHUA COUNTY, FLORIDA. PH.D. DISSERTATION, UNIVERSITY OF CINCINNATI, 1956, 203 PP.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: LAKES DEPOSIT
SEQUENCE NUMBER: 0120010002

NATION: USA STATE: FLORIDA
COUNTY: ALACHUA
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 29 DEG 40 MIN 01 SEC
LONGITUDE: W 82 DEG 04 MIN 59 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3282192 EASTING: 395189
POINT OF REFERENCE: ORE BODY
PRECISION: 500 METERS
ELEVATION: 47 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
OWENS-ILLINOIS, INCORPORATED	OWNER
UNIDENTIFIED OWNERS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB296 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:

NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE

ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

U.S. GEOLOGICAL SURVEY. GAINESVILLE, FLA. N.T.S. SERIES MAP NO. NH-17-7, 1954.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: LA CROSSE DEPOSIT

SEQUENCE NUMBER: 0120010003

NATION: USA STATE: FLORIDA
COUNTY: ALACHUA
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 29 DEG 49 MIN 59 SEC
LONGITUDE: W 82 DEG 23 MIN 28 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3300918 EASTING: 365597
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 40 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

OWNERSHIP
KERR MCGEE RESOURCE CORPORATION

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NORTH BAKER COUNTY DEPOSIT SEQUENCE NUMBER: 0120030001

NATION: USA STATE: FLORIDA COUNTY: BAKER
TYPE OF OPERATION: PROSPECT CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 30 DEG 28 MIN 01 SEC LONGITUDE: W 82 DEG 19 MIN 59 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3371100 EASTING: 372028
POINT OF REFERENCE: ORE BODY PRECISION: 500 METERS
ELEVATION: 40 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

ALTERNATE NAMES
CONTINENTAL CAN DEPOSIT

OWNERSHIP	STATUS
UNITED STATES STEEL CORPORATION	OWNER
CARNEGIE PENSION FUND	OWNER
CONTINENTAL CAN COMPANY	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:	-------EXPLORATION METHODS-------
GEOLOGICAL INFERENCE	CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

U.S. GEOL. SURVEY. LAND USE AND LAND COVER MAP, VALDOSTA. U.S. GEOL. SURVEY OPEN FILE 76-030-1, 1972.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: BROOKER-DUKES
SEQUENCE NUMBER: 0120070002

NATION: USA STATE: FLORIDA
COUNTY: BRADFORD
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 29 DEG 55 MIN 37 SEC
LONGITUDE: W 82 DEG 20 MIN 20 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3311263 EASTING: 370765
POINT OF REFERENCE: ORE BODY
PRECISION: 500 METERS
ELEVATION: 27 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
PRIVATE LEASE; FEE OWNERSHIP;
MINERALS ONLY

OWNERSHIP	STATUS
KERR-MCGEE CORPORATION	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P_2O_5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1960

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED: REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

KERR-MCGEE CORPORATION. PROSPECTUS. JUNE 1976.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286-648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DESERET RANCH

SEQUENCE NUMBER: 0120090001

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: SURFACE
LATITUDE: N 27 DEG 56 MIN 46 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 7 METERS
DATUM: SEA LEVEL

COUNTY: BREVARD
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 80 DEG 50 MIN 13 SEC
NORTHING: 3091071 EASTING: 516040
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

OWNERSHIP
MORMON CHURCH

STATUS
OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB86 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1975

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

BREVARD NEWS (MELBOURNE, FLA.). NOV. 20, 1977, SEC. B, P. 1B.

HIRD, J.M. OVERBURDEN STRIPPING-COMBINATION USE OF DREDGEAND DRAGLINE. MIN. ENG., V. 32, NO. 3, 1980, PP. 311-314.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HARDROCK DEPOSIT
SEQUENCE NUMBER: 0120170001

NATION: USA STATE: FLORIDA
COUNTY: CITRUS
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 29 DEG 00 MIN 29 SEC
LONGITUDE: W 82 DEG 19 MIN 01 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3209416 EASTING: 371731
POINT OF REFERENCE: ORE BODY
PRECISION: 500 METERS
ELEVATION: 28 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
SEVERAL SMALL OWNERSHIPS

STATUS
OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1880

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: ALACHUA FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

U.S. GEOLOGICAL SURVEY. LAND USE AND LAND COVER MAP, GAINESVILLE, PLANT CITY. U.S. GEOL. SURVEY OPEN FILE 76-004-1 AND 76-010-1, 1972.

OCALA (FLA.) STAR-BANNER. ALL TVA LAND IS SOLD IN MARION AND CITRUS. APRIL 1, 1971.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DEEP CREEK

SEQUENCE NUMBER: 0120230001

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: SURFACE
LATITUDE: N 30 DEG 20 MIN 02 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 40 METERS
DATUM: SEA LEVEL

COUNTY: COLUMBIA
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 82 DEG 38 MIN 28 SEC
NORTHING: 3356742 EASTING: 342237
PRECISION: 500 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
MINERALS ONLY; PRIVATE LEASE

ALTERNATE NAMES
MONSANTO TRACT

OWNERSHIP
OCCIDENTAL CHEMICAL COMPANY

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR COLUMBIA COUNTY, FLORIDA IS 1.478 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.5% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I.C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1960

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

A.I.M.E. GUIDEBOOK, FIELD TRIP TO OCCIDENTAL MINES. A.I.M.E., 1977

OCCIDENTAL CHEMICAL COMPANY (DIV. HOOKER CHEM). 1977 10-K REPORT.

OWENS-ILLINOIS. NORTH FLORIDA LAND PROSPECTUS. 1962.

FLORIDA DIVISION OF STATE PLANNING. UPPER SUWANNEE RIVER, EVALUATION OF A PROPOSED DRI AS AN AREA OF CRITICAL STATE CONCERN, 1974.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NORTH LAKE CITY DEPOSIT
SEQUENCE NUMBER: 0120230002

NATION: USA STATE: FLORIDA
COUNTY: COLUMBIA
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 30 DEG 18 MIN 00 SEC
LONGITUDE: W 82 DEG 30 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3352800 EASTING: 355754
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 40 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
PRIVATE LEASE; FEE OWNERSHIP;
MINERALS ONLY

OWNERSHIP
KERR-MCGEE CORPORATION

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR COLUMBIA COUNTY, FLORIDA IS 1.478 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.5% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I.C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1962

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

U.S. GEOLOGICAL SURVEY. SUPPLEMENTAL LAND USE, VALDOSTA, U.S. GEOL. SURVEY OPEN FILE 76-013-7, 1972.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NORTH COLUMBIA COUNTY #2 SEQUENCE NUMBER: 0120230003

NATION: USA STATE: FLORIDA COUNTY: COLUMBIA
TYPE OF OPERATION: SURFACE CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 30 DEG 29 MIN 28 SEC LONGITUDE: W 82 DEG 30 MIN 29 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3373991 EASTING: 355262
POINT OF REFERENCE: ORE BODY PRECISION: 100 METERS
ELEVATION: 45 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
SOUTHERN RESIN CORPORATION	OWNER
UNKNOWN PRIVATE OWNERS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR COLUMBIA COUNTY, FLORIDA IS 1.478 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.5% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I.C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1966

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: OSCEOLA NATIONAL FOREST SEQUENCE NUMBER: 0120230004

NATION: USA STATE: FLORIDA COUNTY: COLUMBIA
TYPE OF OPERATION: SURFACE CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 30 DEG 19 MIN 01 SEC LONGITUDE: W 82 DEG 27 MIN 04 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3354616 EASTING: 360480
POINT OF REFERENCE: ORE BODY PRECISION: 1 KILOMETER
ELEVATION: 35 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE; FEE OWNERSHIP

OWNERSHIP	STATUS
U.S. FOREST SERVICE, DEPARTMENT OF AGRICULTURE	OWNER
NUMEROUS SMALL PRIVATE OWNERSHIPS	OWNER
PITTSBURG AND MIDWAY COAL MINING COMPANY	OPERATOR
GLOBAL EXPLORATION AND DEVELOPMENT CORPORATION	OPERATOR
KERR-MCGEE CHEMICAL CORPORATION	OPERATOR
MONSANTO CHEMICAL PRODUCTS COMPANY	OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR COLUMBIA COUNTY, FLORIDA IS 1.478 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.5% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I.C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

LAKELAND (FLA.) LEDGER. FUQUA WANTS STRIP MINING OUTLAWED IN FOREST. MARCH 14, 1978.

TAMPA (FLA.) TRIBUNE. STUDY SAYS MINE COULD BE ALLOWED IN OSCEOLA FOREST. MARCH 29, 1978

TAMPA (FLA.) TRIBUNE. OSCEOLA MINING PERMIT REQUIRED. APRIL 1, 1978.

U.S. GEOLOGICAL SURVEY. FINAL ENVIRONMENTAL IMPACT STATEMENT PHOSPHATE LEASING ON THE OSCEOLA NATIONAL FOREST, U.S. DEPARTMENT OF INTERIOR (BLM). U.S. GEOL. SURVEY LAND USE AND LAND COVER MAP, 1972-1974.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: COLUMBIA COUNTY #1 DEPOSIT SEQUENCE NUMBER: 0120230005

NATION: USA STATE: FLORIDA COUNTY: COLUMBIA
TYPE OF OPERATION: PROSPECT CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 30 DEG 06 MIN 29 SEC LONGITUDE: W 82 DEG 30 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3331526 EASTING: 355474
POINT OF REFERENCE: ORE BODY PRECISION: 100 METERS
ELEVATION: 40 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
  FEE OWNERSHIP; MINERALS ONLY

ALTERNATE NAMES
  LULU DEPOSIT

OWNERSHIP	STATUS
GONZALES FAMILY	OWNER
RAYONIER INCORPORATED	OWNER-OPERATOR
OTHER UNIDENTIFIED OWNERS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

U.S. GEOLOGICAL SURVEY. SUPPLEMENTAL LAND USE, VALDOSTA. U.S. GEOL. SURVEY OPEN FILE 76-013-7, 1972.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NORTH COLUMBIA DEPOSIT
SEQUENCE NUMBER: 0120230006

NATION: USA STATE: FLORIDA
COUNTY: COLUMBIA
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 30 DEG 29 MIN 49 SEC
LONGITUDE: W 82 DEG 36 MIN 40 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3374773 EASTING: 345379
POINT OF REFERENCE: ORE BODY
PRECISION: 500 METERS
ELEVATION: 40 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1960

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DESOTO-MANATEE RESERVE
SEQUENCE NUMBER: 0120270001

NATION: USA STATE: FLORIDA
COUNTY: DE SOTO
TYPE OF OPERATION: SURFACE
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: N 27 DEG 14 MIN 28 SEC
LONGITUDE: W 82 DEG 03 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3013408 EASTING: 396042
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 17 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
AMAX	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR DESOTO AND SARASOTA COUNTIES, FLORIDA IS 1.175 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.9% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I.C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1964

--------EXPLORATION METHODS--------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286-648/AS, 1978. 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: PINE LEVEL DEPOSIT
SEQUENCE NUMBER: 0120270002

NATION: USA STATE: FLORIDA
COUNTY: DE SOTO
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 15 MIN 00 SEC
LONGITUDE: W 81 DEG 59 MIN 28 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3014345 EASTING: 401880
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 18 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
AMAX	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR DESOTO AND SARASOTA COUNTIES, FLORIDA IS 1.175 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.9% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I.C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1967

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC

BIBLIOGRAPHY RECORDS

ZELLAR-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEMS. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286-648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HORSE CREEK, D.E. CARLTON SEQUENCE NUMBER: 0120270003

NATION: USA STATE: FLORIDA COUNTY: DE SOTO
TYPE OF OPERATION: SURFACE CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 19 MIN 01 SEC LONGITUDE: W 81 DEG 56 MIN 10 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3021718 EASTING: 407381
POINT OF REFERENCE: ORE BODY PRECISION: 1 KILOMETER
ELEVATION: 20 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
  FEE OWNERSHIP

OWNERSHIP		STATUS
D.E. CARLTON		OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

RESERVE/ RESOURCE - REMARKS

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR MANATEE, SARASOTA, AND DESOTO COUNTIES, FLORIDA IS 8.447 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.59% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCES: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1968

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:

NAME OF FORMATION:	HAWTHORN FORMATION	GEOLOGIC AGE: MIOCENE
ROCK TYPE:		
PHOSPHORITE	IS ORE	
SAND	GANGUE	
SILT	GANGUE	
CLAY	GANGUE	
DOLOMITE	GANGUE	

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: W. BETHEL AND ADJACENT DEPOSITS SEQUENCE NUMBER: 0120270004

NATION: USA STATE: FLORIDA COUNTY: DE SOTO
TYPE OF OPERATION: PROSPECT CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 19 MIN 16 SEC LONGITUDE: W 82 DEG 06 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3022312 EASTING: 391170
POINT OF REFERENCE: ORE BODY PRECISION: 100 METERS
ELEVATION: 25 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
  FEE OWNERSHIP

OWNERSHIP	STATUS
W. BETHEL	OWNER
SMALL ADJACENT TRACTS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR MANATEE, SARASOTA, AND DESOTO COUNTIES, FLORIDA IS 8.447 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.59% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU. IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCES: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:	-------EXPLORATION METHODS-------
GEOLOGICAL INFERENCE	GEOLOGICAL INFERENCE

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SUWANNEE RIVER MINE
SEQUENCE NUMBER: 0120470001

NATION: USA STATE: FLORIDA
COUNTY: HAMILTON
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 30 DEG 26 MIN 13 SEC
LONGITUDE: W 82 DEG 46 MIN 37 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3368362 EASTING: 329357
POINT OF REFERENCE: ORE BODY
PRECISION: 500 METERS
ELEVATION: 44 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
PRIVATE LEASE; FEE OWNERSHIP

OWNERSHIP
OCCIDENTAL CHEMICAL COMPANY

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1960
YEAR OF INITIAL PRODUCTION: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND,SILT
90 PERCENT QUICKSAND
PERCENT WASTE ROCK: 52.4
BENCH HEIGHT: 0 METERS
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LATITUDE: N 30 26 13
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE
DESTINATION FACILITY: MILL (ON-SITE)
LATITUDE: N 30 26 13
LOCATION: USA FLORIDA
LONGITUDE: W 82 46 37
DISTANCE (KM): 3.2
LOCATION: USA FLORIDA
LONGITUDE: W 82 46 37

BENEFICIATION:
METHOD: FLOTATION
---DESCRIPTION OF MILLING----
SLURRY/SCREEN/RINSE/ROD MILL/
GRIND/FLOTATION/DRY

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LATITUDE: N 30 26 13
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: CONVEYOR
DESTINATION FACILITY: REFINERY
LATITUDE: N 30 26 13
LOCATION: USA FLORIDA
LONGITUDE: W 82 46 37
DISTANCE (KM): 1
LOCATION: ON-SITE CHEMICAL PLANT
LONGITUDE: W 82 46 37

BIBLIOGRAPHY RECORDS

GUIDEBOOK, A.I.M.E. FIELD TRIP TO OCCIDENTAL MINES. 1977.

OCCIDENTAL (DIV. HOOKER CHEM). 1977 10-K REPORT.

OWENS-ILLINOIS. NORTH FLORIDA LAND PROSPECTUS. 1962.

UPPER SUWANNEE RIVER, EVALUATION OF A PROPOSED DRI AS AN AREA OF CRITICAL STATE CONCERN, FLA. DIV. STATE PLANNING. 1974.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SWIFT CREEK MINE
SEQUENCE NUMBER: 0120470003

NATION: USA STATE: FLORIDA
COUNTY: HAMILTON
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 30 DEG 26 MIN 49 SEC
LONGITUDE: W 82 DEG 51 MIN 22 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3369593 EASTING: 321771
POINT OF REFERENCE: ORE BODY
PRECISION: 500 METERS
ELEVATION: 45 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
PRIVATE LEASE; FEE OWNERSHIP

OWNERSHIP
OCCIDENTAL CHEMICAL COMPANY

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
-------EXPLORATION METHODS-------
CORE DRILLING
YEAR OF DISCOVERY: 1960
YEAR OF INITIAL PRODUCTION: 1975

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR; LENTICULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
BENCH HEIGHT: 0 METERS
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 60 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: USA FLORIDA
LATITUDE: N 30 26 49 LONGITUDE: W 82 51 22
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 30 26 49 LONGITUDE: W 82 51 22

BENEFICIATION:
METHOD: FLOTATION
-------DESCRIPTION OF MILLING------
SLURRY/SCREEN/RINSE/ROD MILL/GRIND/
FLOTATION/DRY

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 30 26 49 LONGITUDE: W 82 51 22
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: CONVEYOR DISTANCE (KM): 0.5
DESTINATION FACILITY: REFINERY LOCATION: USA FLORIDA
LATITUDE: N 30 26 13 LONGITUDE: W 82 46 37

BIBLIOGRAPHY RECORDS

A.I.M.E. GUIDEBOOK, AIME FIELD TRIP TO OCCIDENTAL MINES. 1977.

OCCIDENTAL (DIV. OF HOOKER CHEM.). 1977 FORM 10-K REPORT.

OWENS-ILLINOIS. NORTH FLORIDA LAND PROSPECTUS. 1962.

UPPER SUWANNEE RIVER, EVALUATION OF A PROPOSED D.R.I. AS AN AREA OF CRITICAL STATE CONCERN, FL. DIV. OF STATE PLAN 1974.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HAMILTON COUNTY RECONNIASSANCE SEQUENCE NUMBER: 0120470004

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: PROSPECT
LATITUDE: N 30 DEG 28 MIN 16 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 50 METERS
DATUM: SEA LEVEL

COUNTY: HAMILTON
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 82 DEG 56 MIN 10 SEC
NORTHING: 3372401 EASTING: 314133
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
UNIDENTIFIED OWNERS

STATUS
UNKNOWN

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

U. S. GEOLOGICAL SURVEY. SUPPLEMENTAL LAND USE. VALDOSTA. U.S. GEOL. SURVEY OPEN FILE 76-013-7, 1972

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: WHITE SPRINGS DEPOSIT
SEQUENCE NUMBER: 0120470005

NATION: USA STATE: FLORIDA
COUNTY: HAMILTON
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 30 DEG 20 MIN 28 SEC
LONGITUDE: W 82 DEG 42 MIN 47 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3357646 EASTING: 335332
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 40 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
BROWN WOOD PRESERVING COMPANY	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

U. S. GEOLOGICAL SURVEY. SUPPLEMENTAL LAND USE MAP. VALDOSTA. U.S. GEOL. SURVEY OPEN FILE 76-013-7, 1972.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FARMLAND HARDEE MINE

SEQUENCE NUMBER: 0120490001

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: SURFACE
LATITUDE: N 27 DEG 27 MIN 11 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 25 METERS
DATUM: SEA LEVEL

COUNTY: HARDEE
CURRENT STATUS: DEVELOPING DEPOSIT
LONGITUDE: W 81 DEG 53 MIN 35 SEC
NORTHING: 3036764 EASTING: 411749
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
DUVAL CORPORATION MINE

OWNERSHIP
FARMLAND INDUSTRIES INCORPORATED

STATUS
OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 4.710 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.8% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1955

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

FARMLAND INDUSTRIES INCORPORATED. 1977 ANNUAL REPORT

HERALD ADVOCATE. "PHOSPHATE SALE NETS $ 33 MILLION". DECEMBER 23, 1976.

HERALD ADVOCATE. "FARMLAND INDUSTRIES EYES 1981-82 MINING". APRIL 21, 1977.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ACREFOOT JOHNSON

SEQUENCE NUMBER: 0120490002

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: SURFACE
LATITUDE: N 27 DEG 22 MIN 30 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 22 METERS
DATUM: SEA LEVEL

COUNTY: HARDEE
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 81 DEG 52 MIN 01 SEC
NORTHING: 3028100 EASTING: 414270
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; PRIVATE LEASE;
MINERALS ONLY

ALTERNATE NAMES
LIMESTONE CREEK

OWNERSHIP	STATUS
FREEPORT PHOSPHATE MINING COMPANY	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	RECOVERABLE
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 4.710 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.8% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, H. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLAR-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEMS. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286-648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: B. H. GRIFFIN
SEQUENCE NUMBER: 0120490003

NATION: USA STATE: FLORIDA
COUNTY: HARDEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 24 MIN 30 SEC
LONGITUDE: W 81 DEG 49 MIN 10 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3031760 EASTING: 418991
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 20 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
ZOLFO AREA

OWNERSHIP	STATUS
B. H. GRIFFIN	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 6.826 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.79% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286-648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: C F HARDEE PHOSPHATE COMPLEX SEQUENCE NUMBER: 0120490004

NATION: USA STATE: FLORIDA COUNTY: HARDEE
TYPE OF OPERATION: SURFACE CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 35 MIN 02 SEC LONGITUDE: W 81 DEG 55 MIN 52 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3051283 EASTING: 408097
POINT OF REFERENCE: ORE BODY PRECISION: 500 METERS
ELEVATION: 31 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
  FEE OWNERSHIP

ALTERNATE NAMES
  HARDEE MINE

OWNERSHIP	STATUS
C F INDUSTRIES, INCORPORATED	OWNER
C F MINING CORPORATION	OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 4.710 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.8% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1975
YEAR OF INITIAL PRODUCTION: 1978

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
CALCITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
HARDNESS OF ORE:
QUICKSAND
PERCENT WASTE ROCK: 44.0 METERS
BENCH HEIGHT: 0 METERS
SLOPE OF PIT: 60 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LOCATION: WAUCHULA,FLA.
LATITUDE: N 27 35 02
LONGITUDE: W 81 55 52
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE
DISTANCE (KM): 3.2
DESTINATION FACILITY: MILL (ON-SITE)
LOCATION: WAUCHULA, FLA.
LATITUDE: N 27 35 02
LONGITUDE: W 81 55 52

BENEFICIATION:
METHOD: FLOTATION
-------DESCRIPTION OF MILLING-------
SLURRY/SCREEN/RINSE/PEBBLE PRODUCT/
FEED TO FLOTATION/CLAY TO DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK

ORIGINATING FACILITY:	MILL (ON-SITE)	LOCATION:	WAUCHULA, FLA.
LATITUDE:	N 27 35 02	LONGITUDE:	W 81 55 52
PERCENT SHIPPED:	100		
METHOD OF TRANSPORTATION:	RAIL	DISTANCE (KM):	40
DESTINATION FACILITY:	CHEMICAL PLANT	LOCATION:	BARTOW, FLA.
LATITUDE:	N 27 50 00	LONGITUDE:	W 81 50 00

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286-648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HARDEE MINE

SEQUENCE NUMBER: 0120490005

NATION: USA STATE: FLORIDA
COUNTY: HARDEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 29 MIN 31 SEC
LONGITUDE: W 81 DEG 56 MIN 45 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3041111 EASTING: 406566
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 26 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
PRIVATE LEASE; FEE OWNERSHIP

ALTERNATE NAMES
MISSISSIPPI CHEMICAL CORPORATION

OWNERSHIP
MISSISSIPPI CHEMICAL CORPORATION

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 4.710 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.8% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1967

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HORSE CREEK
SEQUENCE NUMBER: 0120490006

NATION: USA STATE: FLORIDA
COUNTY: HARDEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 26 MIN 49 SEC
LONGITUDE: W 81 DEG 59 MIN 46 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3036164 EASTING: 401559
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 25 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
INTERNATIONAL MINERALS CORPORATION	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 6.826 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.79% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:

NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE

ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78 NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DURRANCE/WATERS TRACT

SEQUENCE NUMBER: 0120490007

NATION: USA STATE: FLORIDA
COUNTY: HARDEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 34 MIN 30 SEC
LONGITUDE: W 82 DEG 01 MIN 30 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3050373 EASTING: 398821
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 37 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; MINERALS ONLY

OWNERSHIP	STATUS
U.S.S. AGRI-CHEMICALS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 4.710 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.8% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1961

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HARDEE WEST PROSPECT
SEQUENCE NUMBER: 0120490008

NATION: USA STATE: FLORIDA
COUNTY: HARDEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 22 MIN 13 SEC
LONGITUDE: W 81 DEG 59 MIN 24 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3027667 EASTING: 402096
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 31 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
20-25 PRIVATE PROPERTIES

STATUS
OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 4.710 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.8% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1975

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286-648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: LIMESTONE LAND COMPANY
SEQUENCE NUMBER: 0120490009

NATION: USA STATE: FLORIDA
COUNTY: HARDEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 25 MIN 30 SEC
LONGITUDE: W 81 DEG 56 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3033686 EASTING: 407746
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 26 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
FARMLAND, MISSISSIPPI CHEM. AREA

OWNERSHIP	STATUS
MR. D.E. CARLTON AND MR. M. WEBER	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 6.826 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.79% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1955

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978. 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MANSON-JENKINS
SEQUENCE NUMBER: 0120490010

NATION: USA STATE: FLORIDA
COUNTY: HARDEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 32 MIN 13 SEC
LONGITUDE: W 82 DEG 02 MIN 49 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3046175 EASTING: 396620
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 38 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; PRIVATE LEASE

ALTERNATE NAMES
USS AGRI-CHEMICALS

OWNERSHIP	STATUS
USS AGRI-CHEMICALS	OWNER
FIRST NATIONAL BANK OF TAMPA	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 4.710 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.8% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: WATERS TRACT

SEQUENCE NUMBER: 0120490011

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: SURFACE
LATITUDE: N 27 DEG 37 MIN 26 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 43 METERS
DATUM: SEA LEVEL

COUNTY: HARDEE
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 82 DEG 01 MIN 59 SEC
NORTHING: 3055794 EASTING: 398072
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
USS AGRI-CHEMICALS

STATUS
OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 4.710 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.8% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1964

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ZOLFO SPRINGS AREA SMALL OWNERSHIPS SEQUENCE NUMBER: 0120490012

NATION: USA STATE: FLORIDA COUNTY: HARDEE
TYPE OF OPERATION: SURFACE CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 27 MIN 00 SEC LONGITUDE: W 81 DEG 46 MIN 40 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3036349 EASTING: 423140
POINT OF REFERENCE: ORE BODY PRECISION: 100 METERS
ELEVATION: 22 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
MINING DEVELOPMENT CORPORATION	OWNER
VARIOUS PRIVATE OWNERS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 4.710 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.8% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: OLLIFF OPTION

SEQUENCE NUMBER: 0120490013

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: SURFACE
LATITUDE: N 27 DEG 32 MIN 40 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 33 METERS
DATUM: SEA LEVEL

COUNTY: HARDEE
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 81 DEG 57 MIN 20 SEC
NORTHING: 3046933 EASTING: 405651
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

OWNERSHIP	STATUS
MATRID OLLIFF	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 6.826 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.79% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:	-------EXPLORATION METHODS-------
GEOLOGICAL INFERENCE	CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPOST 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FREEPORT AREA SMALL OWNERSHIPS SEQUENCE NUMBER: 0120490014

NATION: USA STATE: FLORIDA COUNTY: HARDEE
TYPE OF OPERATION: SURFACE CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 24 MIN 30 SEC LONGITUDE: W 81 DEG 53 MIN 30 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3031809 EASTING: 411851
POINT OF REFERENCE: ORE BODY PRECISION: 100 METERS
ELEVATION: 16 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
LEFFIE CARLTON - OVERLOOK GROVE

OWNERSHIP	STATUS
FREEPORT PHOSPHATE MINING COMPANY	OWNER
OVERLOOK GROVES, INCORPORATED	OWNER
VARIOUS PRIVATE OWNERS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 6.826 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.79% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:	-------EXPLORATION METHODS-------
GEOLOGICAL INFERENCE	CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: D. E. CARLTON

SEQUENCE NUMBER: 0120490015

NATION: USA STATE: FLORIDA
COUNTY: HARDEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 31 MIN 20 SEC
LONGITUDE: W 81 DEG 50 MIN 40 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3044392 EASTING: 416605
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 38 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
D.E.CARLTON

STATUS
OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 6.826 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.79% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FARMLAND/ONA AREA-SMALL OWNERSHIP SEQUENCE NUMBER: 0120490016

NATION: USA STATE: FLORIDA COUNTY: HARDEE
TYPE OF OPERATION: SURFACE CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 26 MIN 38 SEC LONGITUDE: W 81 DEG 52 MIN 37 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3035737 EASTING: 413334
POINT OF REFERENCE: ORE BODY PRECISION: 100 METERS
ELEVATION: 17 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
  FEE OWNERSHIP

OWNERSHIP STATUS
  MISCELLANEOUS FEE-OWNED LANDS OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 6.826 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.79% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD: -------EXPLORATION METHODS-------
  GEOLOGICAL INFERENCE CORE DRILLING
YEAR OF DISCOVERY: 1965

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITSOF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUREAU OF MINES OPEN FILE REPORT 112-78, NTIS: PB 286-648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ZOLFO / STAUFFER

SEQUENCE NUMBER: 0120490017

NATION: USA STATE: FLORIDA
COUNTY: HARDEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 28 MIN 30 SEC
LONGITUDE: W 81 DEG 46 MIN 54 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3039121 EASTING: 422773
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 15 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
STAUFFER CHEMICAL COMPANY	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 4.710 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.8% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

--------EXPLORATION METHODS--------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

STAUFFER CHEMICAL COMPANY. 1976 ANNUAL REPORT.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 649/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MOBIL AREA

SEQUENCE NUMBER: 0120490018

NATION: USA STATE: FLORIDA
COUNTY: HARDEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 36 MIN 12 SEC
LONGITUDE: W 81 DEG 44 MIN 30 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3053312 EASTING: 426810
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 35 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
NUMEROUS SMALL OWNERSHIPS

STATUS
OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 4.710 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.8% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SOUTH HARDEE

SEQUENCE NUMBER: 0120490019

NATION: USA STATE: FLORIDA
COUNTY: HARDEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 31 MIN 40 SEC
LONGITUDE: W 81 DEG 58 MIN 30 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3045101 EASTING: 403716
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 28 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; MINERALS ONLY

ALTERNATE NAMES
GARDINIER SOUTH HARDEE DEPOSIT

OWNERSHIP
GARDINIER INC.
STAUFFER CHEMICAL COMPANY

STATUS
OWNER
UNKNOWN

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 4.710 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.8% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1974

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SHARP PROPERTY
SEQUENCE NUMBER: 0120490020

NATION: USA STATE: FLORIDA
COUNTY: HARDEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 20 MIN 46 SEC
LONGITUDE: W 82 DEG 01 MIN 30 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3025018 EASTING: 398612
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 27 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
SOUTHWEST HARDEE NORTHWEST DESOTO

OWNERSHIP	STATUS
H. SHARP	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR HARDEE COUNTY, FLORIDA IS 6.826 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.79% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

CLAY	GANGUE
SAND	GANGUE
SILT	GANGUE
PHOSPHORITE	IS ORE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: BOYETTE II

SEQUENCE NUMBER: 0120570001

NATION: USA STATE: FLORIDA
COUNTY: HILLSBOROUGH
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 48 MIN 11 SEC
LONGITUDE: W 82 DEG 13 MIN 23 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3075814 EASTING: 379521
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 27 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
JACK O. HOLMES NURSERIES
BOYETTE
FISH HAWK
LITHIA

OWNERSHIP	STATUS
AGRICO CHEMICAL COMPANY	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HILLSBOROUGH COUNTY, FLORIDA IS 900 MILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 7.5% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

WILLIAMS COMPANIES. 1976 FORM 10-K REPORT.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILAVILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78; NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: BIG FOUR
SEQUENCE NUMBER: 0120570002

NATION: USA STATE: FLORIDA
COUNTY: HILLSBOROUGH
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 44 MIN 38 SEC
LONGITUDE: W 82 DEG 04 MIN 41 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3069125 EASTING: 393748
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 33 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
AMAX	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HILLSBOROUGH COUNTY, FLORIDA IS 900 MILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 7.5% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
-------EXPLORATION METHODS-------
CORE DRILLING
YEAR OF DISCOVERY: 1910
YEAR OF INITIAL PRODUCTION: 1977

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
BENCH HEIGHT: 0 METERS
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LATITUDE: N 27 44 38
METHOD OF TRANSPORTATION: PIPELINE
DESTINATION FACILITY: MILL (ON-SITE)
LATITUDE: N 27 44 38
LOCATION: USA FLORIDA
LONGITUDE: W 82 04 41
DISTANCE (KM): 3.2
LOCATION: USA FLORIDA
LONGITUDE: W 82 04 41

BENEFICIATION:
METHOD: FLOTATION
--------- DESCRIPTION OF MILLING -------
SLURRY/SCREEN/RINSE/PEBBLE PRODUCT/
FEED TO FLOTATION/CLAY TO DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LATITUDE: N 27 44 38
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: REFINERY
LATITUDE: N 27 40 00
LOCATION: USA FLORIDA
LONGITUDE: W 82 04 41
DISTANCE (KM): 118
LOCATION: PINEY PT., FL
LONGITUDE: W 82 30 00

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LATITUDE: N 27 44 38
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: REFINERY
LATITUDE: N 28 00 00
LOCATION: USA FLORIDA
LONGITUDE: W 82 04 41
DISTANCE (KM): 45
LOCATION: PLANT CITY, FL
LONGITUDE: W 82 10 00

BIBLIOGRAPHY RECORDS

BORDEN INCORPORATED. 1976 ANNUAL REPORT.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: LONESOME MINE
SEQUENCE NUMBER: 0120570003

NATION: USA STATE: FLORIDA
COUNTY: HILLSBOROUGH
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 44 MIN 28 SEC
LONGITUDE: W 82 DEG 07 MIN 23 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3068858 EASTING: 389309
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 35 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; PRIVATE LEASE

OWNERSHIP	STATUS
BREWSTER PHOSPHATES	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
UNDIFFERENTIATED	50,803,200
UNITS	MT ORE
YEAR/DATA	1981

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	23.5	% BONE PHOSPHATE OF LIME

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. INTERNATIONAL DIRECTORY OF MINING, 1981. P. 190.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF INITIAL PRODUCTION: 1976

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 60 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LATITUDE: N 27 44 28
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE
DESTINATION FACILITY: MILL (ON-SITE)
LATITUDE: N 27 44 28
LOCATION: USA FLORIDA
LONGITUDE: W 82 07 23
LOCATION: USA FLORIDA
LONGITUDE: W 82 07 23

BENEFICIATION:
METHOD: FLOTATION
------DESCRIPTION OF MILLING-------
SLURRY/SCREEN/RINSE/PEBBLE PRODUCT
FEED FLOTATION/CLAY DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LATITUDE: N 27 44 28
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: UNDETERMINED
LOCATION: USA FLORIDA
LONGITUDE: W 82 07 23

BIBLIOGRAPHY RECORDS

ENGINEERING AND MINING JOURNAL. INTERNATIONAL DIRECTORY OF MINING, 1981, P. 190.

HOPPE, RICHHARD W. PHOSPHATE ARE VITAL TO AGRICULTURE - AND FLORIDA MINES FOR OVER ONE-THIRD THE WORLD. END. AND MIN. J., MAY 1976, PP. 79-89.

ZELLAR-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FLORIDA AGGLITE DEBRIS PLANT SEQUENCE NUMBER: 0120570004

NATION: USA STATE: FLORIDA COUNTY: HILLSBOROUGH
TYPE OF OPERATION: SURFACE CURRENT STATUS: PAST PRODUCER
LATITUDE: N 27 DEG 54 MIN 54 SEC LONGITUDE: W 82 DEG 07 MIN 16 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3088120 EASTING: 389677
POINT OF REFERENCE: ORE BODY PRECISION: 100 METERS
ELEVATION: 40 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
- MINERALS ONLY

ALTERNATE NAMES
- AHCAN
- GOOCH
- MCKAY
- RAINBOW
- DEAN STREET

OWNERSHIP	STATUS
SOUTHERN INDUSTRIES	OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR HILLSBOROUGH COUNTY, FLORIDA IS 1.060 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 7.19% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

YEAR OF DISCOVERY: 1935
YEAR OF FINAL PRODUCTION: 1977

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
  NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
  ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FIRST MISSISSIPPI CHEMICAL TRACT SEQUENCE NUMBER: 0120570005

NATION: USA STATE: FLORIDA COUNTY: HILLSBOROUGH
TYPE OF OPERATION: SURFACE CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 41 MIN 38 SEC LONGITUDE: W 82 DEG 11 MIN 20 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3063687 EASTING: 382770
POINT OF REFERENCE: ORE BODY PRECISION: 500 METERS
ELEVATION: 21 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
FIRST MISSISSIPPI CORPORATION	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HILLSBOROUGH COUNTY, FLORIDA IS 900 MILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 7.5% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:	-------EXPLORATION METHODS-------
GEOLOGICAL INFERENCE	CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FARMLAND HILLSBOROUGH RESERVE SEQUENCE NUMBER: 0120570006

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: SURFACE
LATITUDE: N 27 DEG 44 MIN 20 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 21 METERS
DATUM: SEA LEVEL

COUNTY: HILLSBOROUGH
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 82 DEG 12 MIN 00 SEC
NORTHING: 3068683 EASTING: 381722
PRECISION: 500 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
  FEE OWNERSHIP

OWNERSHIP
  FARMLAND INDUSTRIES INCORPORATED

STATUS
  OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HILLSBOROUGH COUNTY, FLORIDA IS 900 MILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 7.5% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1930

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HILLSBOROUGH CO.-FARMLAND/BREWSTER SEQUENCE NUMBER: 0120570007

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: SURFACE
LATITUDE: N 27 DEG 48 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 30 METERS
DATUM: SEA LEVEL

COUNTY: HILLSBOROUGH
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 82 DEG 09 MIN 30 SEC
NORTHING: 3075414 EASTING: 385893
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
  FEE OWNERSHIP

OWNERSHIP
  VARIOUS PRIVATE OWNERS

STATUS
  OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HILLSBOROUGH COUNTY, FLORIDA IS 900 MILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 7.5% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1950

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HUNT BROTHERS RANCH

SEQUENCE NUMBER: 0120570008

NATION: USA STATE: FLORIDA
COUNTY: HILLSBOROUGH
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 40 MIN 30 SEC
LONGITUDE: W 82 DEG 07 MIN 56 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3061543 EASTING: 388338
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 35 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
INTERNATIONAL MINERALS AND CHEMICAL CORP.	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HILLSBOROUGH COUNTY, FLORIDA IS 900 MILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 7.5% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: STANALAND RANCH

SEQUENCE NUMBER: 0120570009

NATION: USA STATE: FLORIDA
COUNTY: HILLSBOROUGH
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 39 MIN 50 SEC
LONGITUDE: W 82 DEG 11 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3060358 EASTING: 383286
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 27 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
ARCO-STANALAND RANCH

OWNERSHIP	STATUS
INTERNATIONAL MINERALS AND CHEMICAL CORP.	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HILLSBOROUGH COUNTY, FLORIDA IS 900 MILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 7.5% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HOPEWELL MINE

SEQUENCE NUMBER: 0120570010

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: SURFACE
LATITUDE: N 27 DEG 55 MIN 30 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 37 METERS
DATUM: SEA LEVEL

COUNTY: HILLSBOROUGH
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 82 DEG 06 MIN 20 SEC
NORTHING: 3089214 EASTING: 391218
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
AMERICAN CYANAMID COMPANY	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR HILLSBOROUGH COUNTY, FLORIDA IS 900 MILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 7.5% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: LITHIA-BOYETTE

SEQUENCE NUMBER: 0120570011

NATION: USA STATE: FLORIDA
COUNTY: HILLSBOROUGH
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 50 MIN 30 SEC
LONGITUDE: W 82 DEG 07 MIN 30 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3079999 EASTING: 389219
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 26 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
AMERICAN CYANAMID COMPANY	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR HILLSBOROUGH COUNTY, FLORIDA IS 1.060 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 7.19% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: EAST PIERCE DEPOSIT
SEQUENCE NUMBER: 0120570012

NATION: USA STATE: FLORIDA
COUNTY: HILLSBOROUGH
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 59 MIN 30 SEC
LONGITUDE: W 82 DEG 10 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3096655 EASTING: 385275
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 47 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
NATIONWIDE PROPERTIES (A SUBSIDIARY OF ESMARK,INC)	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR HILLSBOROUGH COUNTY, FLORIDA IS 1.060 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 7.19% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1920

------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: COOKS HAMMOCK #1

SEQUENCE NUMBER: 0120670001

NATION: USA STATE: FLORIDA
COUNTY: LAFAYETTE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 29 DEG 56 MIN 38 SEC
LONGITUDE: W 83 DEG 18 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3314611 EASTING: 278011
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 20 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
MONSANTO CHEMICAL PRODUCTS CORP.	OWNER
OTHER UNIDENTIFIED OWNERS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: ALACHUA FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286-648/AS 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: COOKS HAMMOCK #2

SEQUENCE NUMBER: 0120670002

NATION: USA STATE: FLORIDA
COUNTY: LAFAYETTE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 29 DEG 53 MIN 13 SEC
LONGITUDE: W 83 DEG 13 MIN 26 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3308155 EASTING: 285237
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 18 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
UNIDENTIFIED MAJOR PAPER COMPANY

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:

NAME OF FORMATION: ALACHUA FORMATION GEOLOGIC AGE: MIOCENE

ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: LAKE COUNTY DEPOSIT
SEQUENCE NUMBER: 0120690001

NATION: USA STATE: FLORIDA
COUNTY: LAKE
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 28 DEG 50 MIN 35 SEC
LONGITUDE: W 81 DEG 29 MIN 38 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3190521 EASTING: 451822
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 7 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
SEMINOLE WOODS, INC.	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1960

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: WINGATE CREEK

SEQUENCE NUMBER: 0120810001

NATION: USA STATE: FLORIDA
COUNTY: MANATEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: N 27 DEG 29 MIN 28 SEC
LONGITUDE: W 82 DEG 09 MIN 11 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3041191 EASTING: 386094
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 35 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; MINERALS ONLY

ALTERNATE NAMES
BEKER PHOSPHATE MINE

OWNERSHIP	STATUS
BEKER PHOSPHATE CORPORATION	OWNER-OPERATOR
UNION OIL CORPORATION	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR MANATEE COUNTY, FLORIDA IS 6.383 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.7% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1964

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

BEKER PHOSPHATE CORPORATION. 1977 10-C REPORT.

BRADENTON HERALD. ONE PLANT MEANS 250 JOBS: BEKER. JULY 16, 1975.

BRADENTON HERALD. BEKER MAKES MOVE TO COMBAT SARASOTA. SEPTEMBER 8, 1975.

SARASOTA HERALD-TRIBUNE. PHOSPHATE MINING PLEA DUE TO BE FILED TODAY. JUNE 10, 1975.

SARASOTA HERALD-TRIBUNE. BEKER LETS PLANT CONTRACT. JULY 16, 1975.

SARASOTA HERALD-TRIBUNE. BEKER DEMANDS SARASOTA COUNTY POST $20 MILLION BOND. SEPTEMBER 9, 1975.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FOUR CORNERS

SEQUENCE NUMBER: 0120810002

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: SURFACE
LATITUDE: N 27 DEG 39 MIN 50 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 44 METERS
DATUM: SEA LEVEL

COUNTY: MANATEE
CURRENT STATUS: DEVELOPING DEPOSIT
LONGITUDE: W 82 DEG 05 MIN 28 SEC
NORTHING: 3060275 EASTING: 392382
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; MINERALS ONLY

ALTERNATE NAMES
P AND R SHELL PIT

OWNERSHIP
W. R. GRACE AND COMPANY

STATUS
OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR MANATEE COUNTY, FLORIDA IS 6.383 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.7% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1920

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
CONTROLLING FEATURE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

APPLICATION FOR DEVELOPMENT OF REGIONAL IMPACT. FOUR CORNERS OPERATION, HILLSBOROUGH COUNTY, 1974.

W. R. GRACE AND COMPANY. 1977 ANNUAL REPORT.

W. R. GRACE AND COMPANY. 10-K REPORT.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUREAU OF MINES OPEN FILE REPORT 112-76, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DUETTE MINE
SEQUENCE NUMBER: 0120810003

NATION: USA STATE: FLORIDA
COUNTY: MANATEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: N 27 DEG 33 MIN 11 SEC
LONGITUDE: W 82 DEG 07 MIN 23 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3048026 EASTING: 389120
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 39 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
MANATEE MINE

OWNERSHIP	STATUS
ESTECH GENERAL CHEMICALS CORP.	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR MANATEE COUNTY, FLORIDA IS 6.383 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.7% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1900

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

SWIFT AGRICULTURAL CHEMICALS CORPORATION. 1977 ANNUAL REPORT.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUREAU OF MINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: KEYS PROPERTY
SEQUENCE NUMBER: 0120810004

NATION: USA STATE: FLORIDA
COUNTY: MANATEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 17 MIN 30 SEC
LONGITUDE: W 82 DEG 05 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3019036 EASTING: 392790
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 23 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
INTERNATIONAL MINERALS AND CHEMICAL CORPORATION	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR MANATEE COUNTY, FLORIDA IS 6.383 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.7% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DAVID C. TURNER HEIRS
SEQUENCE NUMBER: 0120810005

NATION: USA STATE: FLORIDA
COUNTY: MANATEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 34 MIN 30 SEC
LONGITUDE: W 82 DEG 07 MIN 20 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3050456 EASTING: 389224
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 40 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
HEIRS OF DAVID C. TURNER	OWNER
CARLTON TURNER	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR MANATEE COUNTY, FLORIDA IS 6.383 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.7% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: RUTLAND-COLVIN-VALE
SEQUENCE NUMBER: 0120810006

NATION: USA STATE: FLORIDA
COUNTY: MANATEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 34 MIN 00 SEC
LONGITUDE: W 82 DEG 16 MIN 40 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3049681 EASTING: 373859
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 33 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; PRIVATE LEASE

OWNERSHIP	STATUS
INTERNATIONAL MINERALS AND CHEMICAL CORPORATION	OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR MANATEE COUNTY, FLORIDA IS 6.383 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.7% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUREAU OF MINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NORTHEAST MANATEE-ALTMAN TRACT SEQUENCE NUMBER: 0120810007

NATION: USA STATE: FLORIDA COUNTY: MANATEE
TYPE OF OPERATION: PROSPECT CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 36 MIN 40 SEC LONGITUDE: W 82 DEG 04 MIN 18 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3054412 EASTING: 394250
POINT OF REFERENCE: ORE BODY PRECISION: 100 METERS
ELEVATION: 43 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
  FEE OWNERSHIP

OWNERSHIP	STATUS
L. P. ALTMAN	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	AFFECT MARKETABILITY

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR MANATEE, SARASOTA, AND DESOTO COUNTIES, FLORIDA IS 8.447 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.59% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCES: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MANATEE NORTH

SEQUENCE NUMBER: 0120810008

NATION: USA STATE: FLORIDA
COUNTY: MANATEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 31 MIN 10 SEC
LONGITUDE: W 82 DEG 12 MIN 30 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3044382 EASTING: 380663
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 33 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
W. R. GRACE AND COMPANY

STATUS
OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	AFFECT MARKETABILITY

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR MANATEE COUNTY, FLORIDA IS 6.383 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.7% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1957

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978. 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: TEXACO MANATEE

SEQUENCE NUMBER: 0120810009

NATION: USA STATE: FLORIDA
COUNTY: MANATEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 29 MIN 53 SEC
LONGITUDE: W 82 DEG 04 MIN 59 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3041898 EASTING: 393016
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 37 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
TEXACO INCORPORATED

STATUS
OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR MANATEE COUNTY, FLORIDA IS 6.383 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.7% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN/BONE VALLEY FORMATIONS GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MANATEE SOUTH
SEQUENCE NUMBER: 0120810010

NATION: USA STATE: FLORIDA
COUNTY: MANATEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 24 MIN 30 SEC
LONGITUDE: W 82 DEG 11 MIN 30 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3032057 EASTING: 382192
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 23 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
W. R. GRACE AND COMPANY	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR MANATEE COUNTY, FLORIDA IS 6.383 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.7% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:	-------EXPLORATION METHODS-------
GEOLOGICAL INFERENCE	CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. U.S. BUREAU OF MINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: TURNER PROPERTY

SEQUENCE NUMBER: 0120810011

NATION: USA STATE: FLORIDA
COUNTY: MANATEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 34 MIN 16 SEC
LONGITUDE: W 82 DEG 08 MIN 38 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3050045 EASTING: 387082
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 35 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
DAVID, JR. AND NEIL TURNER	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR MANATEE, SARASOTA, AND DESOTO COUNTIES, FLORIDA IS 8.447 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.59% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCES: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1955

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATE; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NORTHEAST MANATEE SWIFT/GRACE SEQUENCE NUMBER: 0120810012

NATION: USA STATE: FLORIDA COUNTY: MANATEE
TYPE OF OPERATION: SURFACE CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 34 MIN 50 SEC LONGITUDE: W 82 DEG 10 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3051112 EASTING: 384843
POINT OF REFERENCE: ORE BODY PRECISION: 100 METERS
ELEVATION: 38 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; PRIVATE LEASE

ALTERNATE NAMES
NORTHEAST MANATEE
W. SCHMID TRACT
POLK TRACT
LEROY CARLTON
CARLTON PROPERTY ESTATE

OWNERSHIP	STATUS
NUMEROUS PRIVATE OWNERS	OWNER
W.R. GRACE AND COMPANY	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR MANATEE COUNTY, FLORIDA IS 6.383 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.7% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1966

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SWIFT/DURRANCE AREA
SEQUENCE NUMBER: 0120810013

NATION: USA STATE: FLORIDA
COUNTY: MANATEE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 34 MIN 10 SEC
LONGITUDE: W 82 DEG 05 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3049806 EASTING: 393058
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 40 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
WALKER PROPERTY
BRADDOCK PROPERTY

OWNERSHIP	STATUS
JUANITA & ISAAC ALBRITTON	OWNER
J. D. WALKER	OWNER
G. V. BRADDOCK	OWNER
C. W. CONE & C. G. GREEN	OWNER
20 SMALL OWNERSHIPS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR MANATEE COUNTY, FLORIDA IS 6.383 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.7% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. U.S. BUREAU OF MINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NORTHEAST MANATEE/TEXACO SEQUENCE NUMBER: 0120810014

NATION: USA STATE: FLORIDA COUNTY: MANATEE
TYPE OF OPERATION: SURFACE CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 28 MIN 30 SEC LONGITUDE: W 82 DEG 07 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3039374 EASTING: 389673
POINT OF REFERENCE: ORE BODY PRECISION: 100 METERS
ELEVATION: 25 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
HENRY P. HOFFSTOT JR.	OWNER
GEORGIA & HERMAN TAYLOR	UNKNOWN
BOWERS & JORDAN	OWNER
D. A. TROIANO	OWNER
FIVE SMALL OWNERSHIPS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR MANATEE COUNTY, FLORIDA IS 6.383 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.7% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HARD ROCK DEPOSIT
SEQUENCE NUMBER: 0120830015

NATION: USA STATE: FLORIDA
COUNTY: MARION
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 28 DEG 54 MIN 29 SEC
LONGITUDE: W 82 DEG 23 MIN 28 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3198418 EASTING: 364376
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 15 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; PRIVATE LEASE

OWNERSHIP	STATUS
TRANSAMMONIA MINERALS CORPORATION	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1974

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: ALACHUA FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

DAVENPORT, J.E., F. CARROLL, G.W. KIEFFER AND S.C. WATKINS. BENEFICIATION OF FLORIDA HARD-ROCK PHOSPHATE. I&EC PROCESS DESIGN AND DEVELOPMENT, VOL 8, OCT 1969, PP. 527-533.

DAVENPORT, J.E. AND S.C. WATKINS. BENEFICIATION OF FLORIDA PEBBLE PHOSPHATE SLIME. I&EC PROCESS AND DESIGN DEVELOPMENT, VOL 8, OCT 1969, PP. 533-539.

KIBLER, O.B. JR. MINING AND PREPARATION OF FLORIDA HARD-ROCK PHOSPHATE. MINING AND METALURGY, OCT 1944, PP. 457-478.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: PAYNE CREEK-PALMETTO

SEQUENCE NUMBER: 0121050001

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 41 MIN 20 SEC
LONGITUDE: W 81 DEG 56 MIN 10 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3062918 EASTING: 407692
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 40 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
AGRICO CHEMICAL COMPANY

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.519 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. P. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

YEAR OF INITIAL PRODUCTION: 1966

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORM OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 60 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LATITUDE: N 27 41 20
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE
DESTINATION FACILITY: MILL (ON-SITE)
LATITUDE: N 27 41 20
LOCATION: USA FLORIDA
LONGITUDE: W 81 56 10
DISTANCE (KM): 3.22
LOCATION: USA FLORIDA
LONGITUDE: W 81 56 10

BENEFICIATION:
METHOD: FLOTATION
----------DESCRIPTION OF MILLING---------
ORE SLURRY/SCREEN/PEBBLE WET ROCK/
STORAGE/FEED FLOTATION/CONCENTRATE WET
ROCK/STORAGE/WASTE RECLAMATION OR DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LATITUDE: N 27 41 20
PERCENT SHIPPED: 20
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: REFINERY
LATITUDE: N 31 05 00
LOCATION: USA FLORIDA
LONGITUDE: W 81 56 10
DISTANCE (KM): 60
LOCATION: DONALDSONVILLE, LOUISIANA
LONGITUDE: W 91 00 00

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 41 20 LONGITUDE: W 81 56 10
PERCENT SHIPPED: 25
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 19
DESTINATION FACILITY: REFINERY LOCATION: PIERCE, FLORIDA
LATITUDE: N 27 55 00 LONGITUDE: W 82 00 00

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 41 20 LONGITUDE: W 81 56 10
PERCENT SHIPPED: 30
DESTINATION FACILITY: FOB MILL LOCATION: EXPORT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 41 20 LONGITUDE: W 81 56 10
PERCENT SHIPPED: 25
DESTINATION FACILITY: FOB MILL LOCATION: DOMESTIC

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NITS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FORT GREEN MINE

SEQUENCE NUMBER: 0121050002

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 40 MIN 05 SEC
LONGITUDE: W 82 DEG 00 MIN 25 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3060666 EASTING: 400688
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 45 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
AGRICO CHEMICAL COMPANY	OWNER-OPERATOR
STAUFFER CHEMICAL COMPANY	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.513 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, P. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1920
YEAR OF INITIAL PRODUCTION: 1975

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORM OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 60 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: USA FLORIDA
LATITUDE: N 27 40 05 LONGITUDE: W 82 00 25
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE DISTANCE (KM): 3.22
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 40 05 LONGITUDE: W 82 00 25

BENEFICIATION:
METHOD: FLOTATION
----------DESCRIPTION OF MILLING----------
ORE SLURRY/SCREEN/PEBBLE WET ROCK STORAGE/
FEED FLOTATION/CONCENTRATE WET ROCK STORAGE/
WASTE RECLAMATION/DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 40 05 LONGITUDE: W 82 00 25
PERCENT SHIPPED: 30
DESTINATION FACILITY: FOB MILL LOCATION: EXPORT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 40 05 LONGITUDE: W 82 00 25
PERCENT SHIPPED: 20
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 60
DESTINATION FACILITY: REFINERY LOCATION: DONALDSONVILLE, LA
LATITUDE: N 31 05 00 LONGITUDE: W 91 00 00

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 40 05 LONGITUDE: W 82 00 25
PERCENT SHIPPED: 25
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 19
DESTINATION FACILITY: REFINERY LOCATION: PIERCE, FLORIDA
LATITUDE: N 27 55 00 LONGITUDE: W 82 00 00

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 40 05 LONGITUDE: W 82 00 25
PERCENT SHIPPED: 25
DESTINATION FACILITY: FOB MILL LOCATION: DOMESTIC

BIBLIOGRAPHY RECORDS

THE WILLIAMS COMPANIES. 1976 FORM 10-K REPORT.

TRAUPPER, WALTER E. AGRICO CHEMICAL COMPANY'S NEW FLORIDA PHOSPHATE WASHER. PIT & QUARRY, AUG. 1976.

VAN DYKE, NANCY. AGRICO CHEMICAL COMPANY APPLIES FOR A MINING PERMIT. THE HERALD-ADVOCATE, FEB. 1978.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NITS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SADDLE CREEK-EBERSBACH
SEQUENCE NUMBER: 0121050003

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 28 DEG 01 MIN 59 SEC
LONGITUDE: W 81 DEG 50 MIN 02 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3100972 EASTING: 418032
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 38 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
SADDLE CREEK MINE

OWNERSHIP
AGRICO CHEMICAL COMPANY

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.519 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF INITIAL PRODUCTION: 1968

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORM OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
HARDNESS OF ORE:
QUICKSAND
PERCENT WASTE ROCK: 62.9
SLOPE OF PIT: 60 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LATITUDE: N 28 01 59
LOCATION: USA FLORIDA
LONGITUDE: W 81 50 02
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE
DISTANCE (KM): 13
DESTINATION FACILITY: MILL (ON-SITE)
LOCATION: USA FLORIDA
LATITUDE: N 28 01 59
LONGITUDE: W 81 50 02

BENEFICIATION:
METHOD: FLOTATION
----------DESCRIPTION OF MILLING-------
ORE SLURRY/SCREEN
PEBBLE WET ROCK STORAGE/FEED FLOTATION/
CONCENTRATE WET ROCK STORAGE/WASTE
RECLAMATION OR DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LOCATION: USA FLORIDA
LATITUDE: N 28 01 59
LONGITUDE: W 81 50 02
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DISTANCE (KM): 60
DESTINATION FACILITY: FOB PORT
LOCATION: EXPORT

BIBLIOGRAPHY RECORDS

THE WILLIAMS COMPANIES. 1976 FORM 10-K REPORT.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FIERCE-PEBBLEDALE
SEQUENCE NUMBER: 0121050004

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 49 MIN 55 SEC
LONGITUDE: W 81 DEG 57 MIN 36 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3078784 EASTING: 405460
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 45 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
AGRICO CHEMICAL COMPANY

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.519 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORM OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

KENNECOTT COPPER CORPORATION. 1976 ANNUAL REPORT.

WILLIAMS COMPANIES. 1977 FORM 10-K REPORT.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. U.S. BUREAU OF MINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HAYNSWORTH MINE
SEQUENCE NUMBER: 0121050005

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 45 MIN 29 SEC
LONGITUDE: W 82 DEG 00 MIN 50 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3070641 EASTING: 400086
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 45 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
BREWSTER PHOSPHATES	OPERATOR
AMERICAN CYANAMID	OWNER
KERR-MCGEE CORPORATION	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INDICATED	36,000,000
UNITS	MT ORE
YEAR/DATA	1981

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. INTERNATIONAL DIRECTORY OF MINING. 1981, P. 190.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
-------EXPLORATION METHODS-------
CORE DRILLING
YEAR OF INITIAL PRODUCTION: 1965

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORM OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 60 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LATITUDE: N 27 45 29
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE
DESTINATION FACILITY: MILL (ON-SITE)
LATITUDE: N 27 45 29
LOCATION: USA FLORIDA
LONGITUDE: W 82 00 50
DISTANCE (KM): 3.2
LOCATION: USA FLORIDA
LONGITUDE: W 82 00 50

BENEFICIATION:
METHOD: FLOTATION
---------- DESCRIPTION OF MILLING -------
SLURRY/WASH-RINSE/PEBBLE PRODUCT/FLOAT/
CONCENTRATE PRODUCT/SHIP

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LATITUDE: N 27 45 29
PERCENT SHIPPED: 70
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: REFINERY
LOCATION: USA FLORIDA
LONGITUDE: W 82 00 50
DISTANCE (KM): 80
LOCATION: UNCLE SAM, LOUISIANA

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LATITUDE: N 27 45 29
PERCENT SHIPPED: 30
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: FOB PORT
LOCATION: USA FLORIDA
LONGITUDE: W 82 00 50
DISTANCE (KM): 80
LOCATION: EXPORT

BIBLIOGRAPHY RECORDS

KERR-MCGEE CORPORATION. 1976 ANNUAL REPORT.

ZELLAR-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: BONNY LAKE MINE
SEQUENCE NUMBER: 0121050006

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 54 MIN 22 SEC
LONGITUDE: W 81 DEG 55 MIN 12 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3086970 EASTING: 409461
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 60 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
W.R. GRACE AND COMPANY

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.519 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF INITIAL PRODUCTION: 1958

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	LIES OVER ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORM OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LATITUDE: N 27 54 22
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE
DESTINATION FACILITY: MILL (ON-SITE)
LATITUDE: N 27 54 22
LOCATION: USA FLORIDA
LONGITUDE: W 81 55 12
DISTANCE (KM): 3.2
LOCATION: USA FLORIDA
LONGITUDE: W 81 55 12

BENEFICIATION:
METHOD: FLOTATION
TOTAL PERCENT USED: 89
----- DESCRIPTION OF MILLING ----
SLURRY/SCREEN/WASH/PEBBLE PRODUCT/
FLOAT/DRY/SHIP

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LATITUDE: N 27 54 22
PERCENT SHIPPED: 69
METHOD OF TRANSPORTATION: CONVEYOR
DESTINATION FACILITY: REFINERY
LATITUDE: N 27 54 22
LOCATION: USA FLORIDA
LONGITUDE: W 81 55 12
DISTANCE (KM): 1.0
LOCATION: ON-SITE
LONGITUDE: W 81 55 12

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LATITUDE: N 27 54 22
PERCENT SHIPPED: 20
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: FOR PORT
LOCATION: USA FLORIDA
LONGITUDE: W 81 55 12
DISTANCE (KM): 70
LOCATION: TAMPA, FLORIDA (EXPORT)

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 54 22
LONGITUDE: W 81 55 12
PERCENT SHIPPED: 11
DESTINATION FACILITY: FOB MILL LOCATION: DOMESTIC MARKETS

BIBLIOGRAPHY RECORDS

W.R. GRACE AND COMPANY. FLORIDA PHOSPHATE OPERATIONS. COMPANY PUBLICATION, 1977.

R.W. HOPPE. PHOSPHATES ARE VITAL TO AGRICULTURE AND FLORIDA MINES FOR ONE THIRD THE WORLD. IN E/MJ OPERATING HANDBOOK OF SURFACE MINING, MCGRAW-HILL, INC., N.Y., 1976, PP. 382-392.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILIBILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HOOPERS PRAIRIE MINE
SEQUENCE NUMBER: 0121050007

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 46 MIN 52 SEC
LONGITUDE: W 81 DEG 56 MIN 20 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3073137 EASTING: 407496
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 40 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
W. R. GRACE AND COMPANY

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.819 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: SANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

------EXPLORATION METHODS------
CORE DRILLING

YEAR OF INITIAL PRODUCTION: 1977

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	LIES OVER ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORM OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LATITUDE: N 27 46 52
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE
DESTINATION FACILITY: MILL (ON-SITE)
LATITUDE: N 27 46 52
LOCATION: USA FLORIDA
LONGITUDE: W 81 56 20
DISTANCE (KM): 3.2
LOCATION: USA FLORIDA
LONGITUDE: W 81 56 20

BENEFICIATION:
METHOD: FLOTATION
TOTAL PERCENT USED: 97
--------- DESCRIPTION OF MILLING -------
SLURRY/SCREEN/WASH/PEBBLE PRODUCT/FLOAT/DRY/SHIP

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LATITUDE: N 27 46 52
PERCENT SHIPPED: 20
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: FOB PORT
LOCATION: USA FLORIDA
LONGITUDE: W 81 56 20
DISTANCE (KM): 70
LOCATION: TAMPA, FLORIDA (EXPORT)

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LATITUDE: N 27 46 52
PERCENT SHIPPED: 69
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: REFINERY
LATITUDE: N 27 54 22
LOCATION: USA FLORIDA
LONGITUDE: W 81 56 20
DISTANCE (KM): 13
LOCATION: BARTOW, FLORIDA
LONGITUDE: W 81 55 12

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 46 52 LONGITUDE: W 81 56 20
PERCENT SHIPPED: 11
DESTINATION FACILITY: FOB MILL LOCATION: DOMESTIC MARKETS

BIBLIOGRAPHY RECORDS

W.R. GRACE AND COMPANY. 1977 ANNUAL REPORT.

R.W. HOPPE. PHOSPHATES ARE VITAL TO AGRICULTURE AND FLORIDA MINES FOR ONE-THIRD THE WORLD. IN E/MJ OPERATING HANDBOOK OF SURFACE MINING, MCGRAW-HILL, INC. NEW YORK, NY, 1976, PP. 382-392.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NORALYN/PHOSPHORIA MINE SEQUENCE NUMBER: 0121050008

NATION: USA STATE: FLORIDA COUNTY: POLK
TYPE OF OPERATION: SURFACE CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 49 MIN 30 SEC LONGITUDE: W 81 DEG 54 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3077971 EASTING: 411363
POINT OF REFERENCE: ORE BODY PRECISION: 100 METERS
ELEVATION: 45 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
INTERNATIONAL MINERALS AND CHEMICAL CORPORATION	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	32,090,000
UNITS	MT ORE
YEAR/DATA	1981

RESERVE/RESERVE - REMARKS

SOURCE FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. INTERNATIONAL DIRECTORY OF MINING. 1981. P. 192.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD: -------EXPLORATION METHODS-------
GEOLOGICAL INFERENCE CORE DRILLING
YEAR OF DISCOVERY: 1920
YEAR OF INITIAL PRODUCTION: 1948

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORM OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND

HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
METHOD OF TRANSPORTATION: PIPELINE
DESTINATION FACILITY: MILL
LATITUDE: N 27 50 37

LOCATION: NORALYN MINE SITE
DISTANCE (KM): 3.2
LOCATION: NORALYN MILL
LONGITUDE: W 81 51 48

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
METHOD OF TRANSPORTATION: PIPELINE
DESTINATION FACILITY: WASH PLANT
LATITUDE: N 27 50 03

LOCATION: PHOSPHORIA MINE SITE
DISTANCE (KM): 3.2
LOCATION: PHOSPHORIA WASH PLANT
LONGITUDE: W 81 54 14

TRANSPORTATION (ORE):
ORIGINATING FACILITY: WASH PLANT
LATITUDE: N 27 50 03
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE
DESTINATION FACILITY: MILL
LATITUDE: N 27 50 37

LOCATION: PHOSPHORIA WASH PLANT
LONGITUDE: W 81 54 14

DISTANCE (KM): 6.4
LOCATION: NORALYN MILL
LONGITUDE: W 81 51 48

BENEFICIATION:
METHOD: FLOTATION

---------- DESCRIPTION OF MILLING -------
SLURRY/SCREEN/RINSE/PEBBLE PRODUCT/
FEED TO FLOTATION/CLAY TO DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL — LOCATION: NORALYN MILL
LATITUDE: N 27 50 37 — LONGITUDE: W 81 51 48
PERCENT SHIPPED: 30
DESTINATION FACILITY: FOB MILL — LOCATION: TAMPA, FLORIDA (EXPORT)

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL — LOCATION: NORALYN MILL
LATITUDE: N 27 50 37 — LONGITUDE: W 81 51 48
PERCENT SHIPPED: 46
METHOD OF TRANSPORTATION: RAIL — DISTANCE (KM): 17
DESTINATION FACILITY: REFINERY — LOCATION: MULBERRY, FLORIDA

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL — LOCATION: NORALYN MILL
LATITUDE: N 27 50 37 — LONGITUDE: W 81 51 48
PERCENT SHIPPED: 23
METHOD OF TRANSPORTATION: RAIL — DISTANCE (KM): 8
DESTINATION FACILITY: REFINERY — LOCATION: IMC'S NEW WALES CHEMICALS OPERATION

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL — LOCATION: NORALYN MILL
LATITUDE: N 27 50 37 — LONGITUDE: W 81 51 48
PERCENT SHIPPED: 1
DESTINATION FACILITY: FOB MILL — LOCATION: DOMESTIC MARKETS

BIBLIOGRAPHY RECORDS

ENGINEERING AND MINING JOURNAL. INTERNATIONAL DIRECTORY OF MINING. 1981, P. 192.

INTERNATIONAL MINERALS & CHEMICAL CORP. 1976 ANNUAL REPORT.

INTERNATIONAL MINERALS & CHEMICAL CORP. 1976 FORM 10-K REPORT.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS:
PB 286 648/AS, 1978. 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: KINGSFORD MINE
SEQUENCE NUMBER: 0121050009

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 50 MIN 02 SEC
LONGITUDE: W 81 DEG 59 MIN 53 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3079029 EASTING: 401714
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 50 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; PRIVATE LEASE

OWNERSHIP	STATUS
INTERNATIONAL MINERALS AND CHEMICAL CORPORATION	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	50,100,000
UNITS	MT ORE
YEAR/DATA	1981

RESERVE/RESOUCE - REMARKS

SOURCE FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. INTERNATIONAL DIRECTORY OF MINING. 1981. P. 192.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1920
YEAR OF INITIAL PRODUCTION: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
100 PERCENT SAND, SILT
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 60 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: USA FLORIDA
LATITUDE: N 27 50 02 LONGITUDE: W 81 59 53
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE DISTANCE (KM): 4.7
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 50 02 LONGITUDE: W 81 59 53

BENEFICIATION:
METHOD: FLOTATION
---------- DESCRIPTION OF MILLING ---------
ORE SLURRY, SCREEN/PEBBLE WET ROCK STORAGE/
FEED FLOTATION/CONCENTRATE WET ROCK STORAGE/
WASTE RECLAMATION-DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 50 02 LONGITUDE: W 81 59 53
PERCENT SHIPPED: 30
DESTINATION FACILITY: FOB MILL LOCATION: TAMPA, FLORIDA (EXPORT)

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 50 02 LONGITUDE: W 81 59 53
PERCENT SHIPPED: 46
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 11.2
DESTINATION FACILITY: REFINERY LOCATION: BARTOW, FLORIDA
LATITUDE: N 27 50 00 LONGITUDE: W 81 50 00

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 50 00 LONGITUDE: W 81 59 53
PERCENT SHIPPED: 99
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 4.8
DESTINATION FACILITY: REFINERY LOCATION: NEW WALES, FLORIDA
LATITUDE: N 27 50 00 LONGITUDE: W 82 00 00

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 50 02 LONGITUDE: W 81 59 53
PERCENT SHIPPED: 1
DESTINATION FACILITY: FOB MILL LOCATION: DOMESTIC

BIBLIOGRAPHY RECORDS

ENGINEERING AND MINING JOURNAL. INTERNATIONAL DIRECTORY OF MINING. 1981, P. 182.

IMC CORPORATION. 1977 ANNUAL REPORT TO STOCKHOLDERS. PP. 1-14.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CLEAR SPRINGS
SEQUENCE NUMBER: 0121050010

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 51 MIN 11 SEC
LONGITUDE: W 81 DEG 48 MIN 29 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3081015 EASTING: 420439
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 40 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; PRIVATE LEASE

OWNERSHIP	STATUS
INTERNATIONAL MINERALS AND CHEMICAL CORPORATION	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	31,100,000
UNITS	MT ORE
YEAR/DATA	1981

RESERVE/RESOUCE - REMARKS

SOURCE FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. INTERNATIONAL DIRECTORY OF MINING. 1981. P. 192.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
-------EXPLORATION METHODS-------
CORE DRILLING
YEAR OF INITIAL PRODUCTION: 1948

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORM OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND

HARDNESS OF ORE:
QUICKSAND

SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: CLEAR SPRINGS, FLORIDA
LATITUDE: N 27 51 11 LONGITUDE: W 81 48 29
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE DISTANCE (KM): 3.2
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: CLEAR SPRINGS, FLORIDA
LATITUDE: N 27 51 11 LONGITUDE: W 81 48 29

BENEFICIATION:
METHOD: FLOTATION
--------- DESCRIPTION OF MILLING -------
SLURRY/SCREEN/WASH/PEBBLE PRODUCT/FLOAT/
CLAY TO TAILS

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: CLEAR SPRINGS, FLORIDA
LATITUDE: N 27 51 11 LONGITUDE: W 81 48 29
PERCENT SHIPPED: 30
DESTINATION FACILITY: FOB PORT LOCATION: TAMPA, FLORIDA (EXPORT)

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: CLEAR SPRINGS, FLORIDA
LATITUDE: N 27 51 11 LONGITUDE: W 81 48 29
PERCENT SHIPPED: 46
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 6
DESTINATION FACILITY: REFINERY LOCATION: CENTRAL FARMERS' CHEMICAL FACILITY

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: CLEAR SPRINGS, FLORIDA
LATITUDE: N 27 51 11 LONGITUDE: W 81 48 29
PERCENT SHIPPED: 23
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 16
DESTINATION FACILITY: REFINERY LOCATION: IMC'S NEW WALES CHEMICALS OPERATION

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: CLEAR SPRINGS, FLORIDA
LATITUDE: N 27 51 11 LONGITUDE: W 81 48 29
PERCENT SHIPPED: 1
DESTINATION FACILITY: FOB MILL LOCATION: DOMESTIC MARKETS

BIBLIOGRAPHY RECORDS

ENGINEERING AND MINING JOURNAL. INTERNATIONAL DIRECTORY OF MINING. 1981, P. 192.

INTERNATIONAL MINERALS AND CHEMICALS CORPORATION. 1977 ANNUAL REPORT.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NICHOLS MINE

SEQUENCE NUMBER: 0121050011

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: SURFACE
LATITUDE: N 27 DEG 52 MIN 06 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 35 METERS
DATUM: SEA LEVEL

COUNTY: POLK
CURRENT STATUS: PRODUCER
LONGITUDE: W 82 DEG 00 MIN 54 SEC
NORTHING: 3083474 EASTING: 400082
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
MOBIL CHEMICAL COMPANY

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.519 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1915
YEAR OF INITIAL PRODUCTION: 1970

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORM OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 60 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: NICHOLS, FLORDIA
LATITUDE: N 27 52 26 LONGITUDE: W 82 00 54
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE DISTANCE (KM): 3.2
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: NICHOLS, FLORIDA
LATITUDE: N 27 52 26 LONGITUDE: W 82 00 54

BENEFICIATION:
METHOD: FLOTATION
---------- DESCRIPTION OF MILLING -------
SLURRY/SCREEN/RINSE/PEBBLE PRODUCT/
FEED TO FLOTATION/CLAY TO DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: NICHOLS, FLORIDA
LATITUDE: N 27 52 26 LONGITUDE: W 82 00 54
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 20
DESTINATION FACILITY: REFINERY LOCATION: BARTOW, FLORIDA

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: NICHOLS, FLORIDA
LATITUDE: N 27 52 26 LONGITUDE: W 82 00 54
METHOD OF TRANSPORTATION: RAIL; RIVER DISTANCE (KM): 60; 2040
DESTINATION FACILITY: REFINERY LOCATION: DEPUE, ILLINOIS

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: NICHOLS, FLORIDA
LATITUDE: N 27 52 26 LONGITUDE: W 82 00 54
DESTINATION FACILITY: FOB MILL LOCATION: DOMESTIC MARKETS

BIBLIOGRAPHY RECORDS

HOPPE, R.W. PHOSPHATES ARE VITAL TO AGRICULTURE AND FLORIDA MINES FOR ONE THIRD THE WORLD. IN ENG. AND MIN. J. OPERATING HANDBOOK OF SURFACE MINING, MCGRAW-HILL INC. NEW YORK, NY, 1976, PP. 382-392.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SOUTH FORT MEADE MINE
SEQUENCE NUMBER: 0121050012

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: N 27 DEG 40 MIN 30 SEC
LONGITUDE: W 81 DEG 44 MIN 28 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3061250 EASTING: 426912
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 45 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; PRIVATE LEASE

OWNERSHIP	STATUS
MOBIL CHEMICAL COMPANY	OWNER-OPERATOR
COASTAL CHEMICAL CORPORATION	OWNER
TENNESSEE VALLEY AUTHORITY	OWNER
SMALL LANDOWNERS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.519 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. P. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1960

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA, USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 640/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FORT MEADE MINE (MOBIL) SEQUENCE NUMBER: 0121050013

NATION: USA STATE: FLORIDA COUNTY: POLK
TYPE OF OPERATION: SURFACE CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 47 MIN 20 SEC LONGITUDE: W 81 DEG 47 MIN 49 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3073899 EASTING: 421487
POINT OF REFERENCE: ORE BODY PRECISION: 100 METERS
ELEVATION: 36 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
  FEE OWNERSHIP

OWNERSHIP	STATUS
MOBIL CHEMICAL COMPANY	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.519 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:	-------EXPLORATION METHODS-------
GEOLOGICAL INFERENCE	CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
100 PERCENT SAND, SILT
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 60 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: USA FLORIDA
LATITUDE: N 27 41 20 LONGITUDE: W 81 47 49
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE DISTANCE (KM): 3.2
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 41 20 LONGITUDE: W 81 47 49

BENEFICIATION:
METHOD: FLOTATION
---------- DESCRIPTION OF MILLING ---------
ORE SLURRY/SCREEN/PEBBLE WET ROCK STORAGE/
FEED FLOTATION/CONCENTRATE WET ROCK STORAGE/
WASTE/RECLAMATION-DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 41 20 LONGITUDE: W 81 47 49
METHOD OF TRANSPORTATION: RAIL;RIVER DISTANCE (KM): 60; 2400
DESTINATION FACILITY: REFINERY LOCATION: DEPUE, ILLINOIS
LATITUDE: N 41 20 00 LONGITUDE: W 89 15 00

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 41 20 LONGITUDE: W 81 47 49
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 20
DESTINATION FACILITY: REFINERY LOCATION: BARTOW, FLORIDA
LATITUDE: N 27 50 00 LONGITUDE: W 81 50 00

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 41 20 LONGITUDE: W 81 47 49
DESTINATION FACILITY: FOB MILL

BIBLIOGRAPHY RECORDS

THE ARCADIAN. PHOSPHATE WASTES LEAKED INTO RIVER. MARCH 6, 1975.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: WATSON MINE

SEQUENCE NUMBER: 0121050014

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 43 MIN 30 SEC
LONGITUDE: W 81 DEG 48 MIN 40 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3066832 EASTING: 420045
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 35 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
ESTECH GENERAL CHEMICALS CORPORATION	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABILITY
ALUMINUM	ALUMINA	AFFECT MARKETABILITY
MAGNESIUM	OXIDE	AFFECT MARKETABILITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.519 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1906
YEAR OF INITIAL PRODUCTION: 1936

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORM OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: USA FLORIDA
LATITUDE: N 27 43 30 LONGITUDE: W 81 48 40
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE DISTANCE (KM): 3.2
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 43 30 LONGITUDE: W 81 48 40

BENEFICIATION:
METHOD: FLOTATION
------ DESCRIPTION OF MILLING ------
SLURRY/SCREEN/RINSE/PEBBLE PRODUCT/
FEED TO FLOTATION/CLAY TO DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 43 30 LONGITUDE: W 81 48 40
PERCENT SHIPPED: 76
DESTINATION FACILITY: FOB MILL LOCATION: TAMPA, FL (EXPORT)

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 43 30 LONGITUDE: W 81 48 40
PERCENT SHIPPED: 22
DESTINATION FACILITY: FOB MILL LOCATION: DOMESTIC

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 43 30 LONGITUDE: W 81 46 40
PERCENT SHIPPED: 2
DESTINATION FACILITY: REFINERY LOCATION: INTERNAL CONSUMPTION

BIBLIOGRAPHY RECORDS

SWIFT AGRICULTURAL CHEMICALS CORPORATION. 1976 ANNUAL REPORT.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SILVER CITY MINE
SEQUENCE NUMBER: 0121050015

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 48 MIN 00 SEC
LONGITUDE: W 81 DEG 54 MIN 11 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3075203 EASTING: 411042
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 50 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
ESTECH GENERAL CHEMICALS CORPORATION	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.519 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1906

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	CANGUE
SILT	CANGUE
CLAY	CANGUE
DOLOMITE	CANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LOCATION: USA FLORIDA
LATITUDE: N 27 48 00
LONGITUDE: W 81 54 11
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE
DISTANCE (KM): 3.2
DESTINATION FACILITY: MILL (ON-SITE)
LOCATION: USA FLORIDA
LATITUDE: N 27 48 00
LONGITUDE: W 81 54 11

BENEFICIATION:
METHOD: FLOTATION
---------- DESCRIPTION OF MILLING -------
SLURRY/SCREEN/RINSE/PEBBLE PRODUCT/
FEED TO FLOTATION/CLAY TO DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LOCATION: USA FLORIDA
LATITUDE: N 27 48 00
LONGITUDE: W 81 54 11
PERCENT SHIPPED: 76
DESTINATION FACILITY: FOB MILL
LOCATION: EXPORT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LOCATION: USA FLORIDA
LATITUDE: N 27 48 00
LONGITUDE: W 81 54 11
PERCENT SHIPPED: 22
DESTINATION FACILITY: FOB MILL
LOCATION: DOMESTIC

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 48 00 LONGITUDE: W 81 54 11
PERCENT SHIPPED: 2
DESTINATION FACILITY: REFINERY LOCATION: INTERNAL CONSUMPTION

BIBLIOGRAPHY RECORDS

SWIFT AGRICULTURAL CHEMICALS CORPORATION. 1977 ANNUAL REPORT.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: LITTLE PAYNE CREEK
SEQUENCE NUMBER: 0121050016

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 37 MIN 25 SEC
LONGITUDE: W 81 DEG 52 MIN 25 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3055643 EASTING: 413804
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 34 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; MINERALS ONLY;
PRIVATE LEASE

ALTERNATE NAMES
NORTH HARDEE DEPOSIT
SMALL TRACTS GARDINIER USSAC AREA

OWNERSHIP	STATUS
UNITED STATES STEEL AGRI-CHEMICALS	OWNER-OPERATOR
GARDINIER INC.	OWNER
150 SMALL LANDOWNERS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.919 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1950

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLAR-WILLIAMS,INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEMS. BUMINES OPEN FILE REPORT 112-78, NTIS:PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ROCKLAND MINE

SEQUENCE NUMBER: 0121050017

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: SURFACE
LATITUDE: N 27 DEG 45 MIN 14 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 50 METERS
DATUM: SEA LEVEL

COUNTY: POLK
CURRENT STATUS: PRODUCER
LONGITUDE: W 81 DEG 52 MIN 01 SEC
NORTHING: 3070069 EASTING: 414563
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
UNITED STATES STEEL AGRI-CHEMICALS	OWNER-OPERATOR
FREEPORT PHOSPHATE ROCK COMPANY	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	18,000,000
INDICATED	23,000,000
UNITS	MT ORE
YEAR/DATA	1981

RESERVE/RESOUCE - REMARKS

SOURCE FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. INTERNATIONAL DIRECTORY OF MINING. 1981, P. 190.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1920
YEAR OF INITIAL PRODUCTION: 1968

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: USA FLORIDA
LATITUDE: N 27 45 14 LONGITUDE: W 81 52 01
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE DISTANCE (KM): 3.2
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 45 14 LONGITUDE: W 81 52 01

BENEFICIATION:
METHOD: FLOTATION ---------- DESCRIPTION OF MILLING -------
SLURRY/SCREEN/RINSE/PEBBLE PRODUCT/
FEED FLOTATION/CLAY TO DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 45 14 LONGITUDE: W 81 52 01
PERCENT SHIPPED: 50
METHOD OF TRANSPORTATION: RAIL; OCEAN DISTANCE (KM): 76; 550
DESTINATION FACILITY: REFINERY LOCATION: USA LOUISIANA
LATITUDE: N 30 00 00 LONGITUDE: W 90 55 00

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA FLORIDA
LATITUDE: N 27 45 14 LONGITUDE: W 81 52 01
PERCENT SHIPPED: 50
DESTINATION FACILITY: REFINERY LOCATION: USA FLORIDA
LATITUDE: N 27 45 14 LONGITUDE: W 81 52 01

BIBLIOGRAPHY RECORDS

ENGINEERING AND MINING JOURNAL. INTERNATIONAL DIRECTORY OF MINING. 1981. P. 190.

ZELLAR-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEMS. BUMINES OPEN FILE REPORT 112-79, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FORT MEADE MINE (GARDINIER)
SEQUENCE NUMBER: 0121050019
NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 41 MIN 13 SEC
LONGITUDE: W 81 DEG 50 MIN 49 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3062640 EASTING: 416483
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 40 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
TENCOR MINE

OWNERSHIP
GARDINIER INC.

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.519 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
-------EXPLORATION METHODS-------
CORE DRILLING
YEAR OF INITIAL PRODUCTION: 1967

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
10 PERCENT SAND, SILT
90 PERCENT QUICKSAND
PERCENT WASTE ROCK: 46.6
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LATITUDE: N 27 41 13
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE
DESTINATION FACILITY: MILL (ON-SITE)
LATITUDE: N 27 41 13
LOCATION: USA FLORIDA
LONGITUDE: W 81 50 49
DISTANCE (KM): 4.8
LOCATION: USA FLORIDA
LONGITUDE: W 81 50 49

BENEFICIATION:
METHOD: FLOTATION
-------- DESCRIPTION OF MILLING -------
SLURRY/SCREEN/RINSE/PEBBLE PRODUCT/
FEED TO FLOTATION/CLAY TO DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LATITUDE: N 27 41 13
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: REFINERY
LATITUDE: N 28 00 00
LOCATION: USA FLORIDA
LONGITUDE: W 81 50 49
DISTANCE (KM): 107
LOCATION: TAMPA, FLORIDA
LONGITUDE: W 82 40 00

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: POLK COUNTY MINE
SEQUENCE NUMBER: 0121050020

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 27 DEG 51 MIN 22 SEC
LONGITUDE: W 81 DEG 58 MIN 37 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3081475 EASTING: 403813
POINT OF REFERENCE: ORE BODY
ELEVATION: 40 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
OLD ACHAN (IMC) DEBRIS AND MATRIX
T/A MINERALS POLK COUNTY MINE

OWNERSHIP	STATUS
TRANS AMMONIA MINERALS CORPORATION	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.519 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1974
YEAR OF INITIAL PRODUCTION: 1976

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: IRREGULAR; MASSIVE
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
CLAY	GANGUE
SILT	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
100 PERCENT SAND, SILT
PERCENT WASTE ROCK: 57.5
HARDNESS OF ORE:
SAND, SILT
SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: MULBERRY, FLORIDA
LATITUDE: N 27 51 22 LONGITUDE: W 81 58 37
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE DISTANCE (KM): 3.2
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: MULBERRY FLORIDA
LATITUDE: N 27 51 22 LONGITUDE: W 81 58 37

BENEFICIATION:
METHOD: FLOTATION
---------- DESCRIPTION OF MILLING -------
SLURRY/SCREEN/RINSE/PEBBLE PRODUCT/
FEED TO FLOTATION/CLAY TO DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: MULBERRY, FLORIDA
LATITUDE: N 27 51 22 LONGITUDE: W 81 58 37
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 11
DESTINATION FACILITY: REFINERY LOCATION: BARTOW, FLORIDA

BIBLIOGRAPHY RECORDS

HOPPE, R. W. PHOSPHATES ARE VITAL TO AGRICULTURE AND FLORIDA MINES FOR ONE THIRD THE WORLD. IN E/MJ OPERATING HANDBOOK OF SURFACE MINING, MCGRAW-HILL, INC. NEW YORK, NY, 1976, PP. 382-392.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FRIDOVICH

SEQUENCE NUMBER: 0121050023

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 28 DEG 00 MIN 40 SEC
LONGITUDE: W 82 DEG 01 MIN 15 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3098681 EASTING: 399634
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 41 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
LAKELAND AIRPORT
DRANE FIELD TRACT
WEST LAKELAND VENTURE

OWNERSHIP	STATUS
AGRI-LEIS CORPORATION	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.519 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1936

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CHRISTINA RESERVE

SEQUENCE NUMBER: 0121050024

NATION: USA STATE: FLORIDA
COUNTY: POLK
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 56 MIN 40 SEC
LONGITUDE: W 82 DEG 00 MIN 10 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3091280 EASTING: 401349
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 35 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
MOBIL CHEMICAL COMPANY	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR POLK COUNTY, FLORIDA IS 2.519 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.0% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1930

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: BONE VALLEY FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 28E 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ST JOHN'S COUNTY DEPOSIT
SEQUENCE NUMBER: 0121090001

NATION: USA STATE: FLORIDA
COUNTY: ST JOHN'S
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 30 DEG 03 MIN 47 SEC
LONGITUDE: W 81 DEG 27 MIN 22 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3325679 EASTING: 456035
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 13 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; MINERALS ONLY;
PRIVATE LEASE

OWNERSHIP	STATUS
AGRICO CHEMICAL COMPANY	OWNER
MOBIL (CONTAINER CORPORATION)	OWNER
VARIOUS UNIDENTIFIED OWNERS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

U. S. GEOLOGICAL SURVEY. LAND-USE LAND COVER MAP, JACKSONVILLE. U. S. GEOL. SURVEY OPEN FILE 76-031-1, 1972.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SARASOTA COUNTY DEPOSIT NO. 1 SEQUENCE NUMBER: 0121150001

NATION: USA STATE: FLORIDA
TYPE OF OPERATION: SURFACE
LATITUDE: N 27 DEG 06 MIN 50 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 10 METERS
DATUM: SEA LEVEL

COUNTY: SARASOTA
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 82 DEG 06 MIN 29 SEC
NORTHING: 2999364 EASTING: 390169
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
GEORGE KELCE	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR DESOTO AND SARASOTA COUNTIES, FLORIDA IS 1.175 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.9% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I.C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:	-------EXPLORATION METHODS-------
GEOLOGICAL INFERENCE	CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN/BONE VALLEY FORMATIONS GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SARASOTA COUNTY DEPOSIT NO. 2 SEQUENCE NUMBER: 0121150002

NATION: USA STATE: FLORIDA COUNTY: SARASOTA
TYPE OF OPERATION: SURFACE CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 27 DEG 11 MIN 10 SEC LONGITUDE: W 82 DEG 09 MIN 14 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3007406 EASTING: 385699
POINT OF REFERENCE: ORE BODY PRECISION: 100 METERS
ELEVATION: 12 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR MANATEE, SARASOTA, AND DESOTO COUNTIES, FLORIDA IS 8.447 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 4.59% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCES: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:	--------EXPLORATION METHODS-------
GEOLOGICAL INFERENCE	GEOLOGICAL INFERENCE

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: LIVE OAK DEPOSIT
SEQUENCE NUMBER: 0121210004

NATION: USA STATE: FLORIDA
COUNTY: SUWANNEE
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 30 DEG 13 MIN 26 SEC
LONGITUDE: W 83 DEG 54 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3346970 EASTING: 220866
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 50 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERAL? AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MCALPIN DEPOSIT
SEQUENCE NUMBER: 0121210005

NATION: USA STATE: FLORIDA
COUNTY: SUWANNEE
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 30 DEG 05 MIN 46 SEC
LONGITUDE: W 82 DEG 54 MIN 40 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3330795 EASTING: 315834
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 30 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR NORTHERN, EAST COAST, AND HARD ROCK DISTRICTS IN FLORIDA IS 10.507 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 5.46% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB286 648/AS, 1978, 199 PP.

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OR ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

U. S. GEOLOGICAL SURVEY. LAND USE AND LAND COVER, VALDOSTA. U.S. GEOL. SURVEY OPEN FILE 76-013-7, 1972.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

GEORGIA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SAVANNAH DEPOSIT

SEQUENCE NUMBER: 0130510004

NATION: USA STATE: GEORGIA
TYPE OF OPERATION: SURFACE
LATITUDE: N 31 DEG 57 MIN 30 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 3 METERS
DATUM: SEA LEVEL

COUNTY: CHATHAM
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 80 DEG 58 MIN 30 SEC
NORTHING: 3535629 EASTING: 502362
PRECISION: 5 KILOMETERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; FEDERAL LEASE;
STATE LEASE

OWNERSHIP	STATUS
UNIDENTIFIED OWNER	OWNER
STATE & FEDERAL LEASE AREAS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA IS 20.971 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.79% OF P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 14-79, 1978, 65 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

FURLOW, JAMES W. STRATIGRAPHY AND ECONOMIC GEOLOGY OF THE EASTERN CHATHAM COUNTY PHOSPHATE DEPOSIT. GEORGIA GEOLOGICAL SURVEY BULLETIN NO. 82, ATLANTA, 1969.

HERRICK, STEPHEN M. WELL LOGS OF THE COASTAL PLAIN OF GEORGIA. GEORGIA GEOLOGICAL SURVEY BULL. NO. 70, PP. 78-109, ATLANTA, GEORGIA.

KRAUSE, R. E., AND D. O. GREGG. WATER FROM THE PRINCIPLE ARTESIAN AQUIFER IN COASTAL GEORGIA. 1972.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OFEN FILE REPORT 14-79, 1978, 65 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: STATENVILLE DEPOSIT
SEQUENCE NUMBER: 0131010001

NATION: USA STATE: GEORGIA
COUNTY: ECHOLS
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 30 DEG 43 MIN 00 SEC
LONGITUDE: W 83 DEG 07 MIN 30 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 3399946 EASTING: 296510
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 46 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
PRIVATE LEASE; FEE OWNERSHIP;
MINERALS ONLY

ALTERNATE NAMES
SOUTH GEORGIA

OWNERSHIP
VARIOUS PRIVATE OWNERS

STATUS
UNKNOWN

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA IS 20.971 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.79% OF P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 14-79, 1978, 65 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1890

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	SILICATES	PHANERITIC-FINE
COLLOPHANE	PHOSPHATES	PHANERITIC-FINE
MONTMORILLONITE	SILICATES	PHANERITIC-FINE

BIBLIOGRAPHY RECORDS

GEORGIA DEPT. OF MINES, MINING, AND GEOLOGY. SOUTH GEORGIA MINERALS PROGRAM. PROJECT REPORT NOS. 2, 3, 4, 5, 6, 7, 9 11. 5/66, 8/66, 10/66, 2/67, 5/67, 5/67, 11/67 AND 4/69.

THE BRITISH SULPHER CORPORATION LIMITED. GEORGIA OCCURRENCES & DEPOSITS. WORLD SURVEY OF PHOSPHATE DEPOSITS. 3RD ED. NOVEMBER 1973.

ZELLARS-WILLIAMS INC.,EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM, BUMINES OPEN FILE REPORT 112-78, NTIS: PB 286 648/AS, 1978, 199 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

IDAHO

DEPOSIT NAME: GAY MINE

SEQUENCE NUMBER: 0160110035

NATION: USA STATE: IDAHO
COUNTY: BINGHAM
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 43 DEG 02 MIN 55 SEC
LONGITUDE: W 112 DEG 07 MIN 15 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4766607 EASTING: 408711
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 1725 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
PRIVATE LEASE

OWNERSHIP	STATUS
BANNOCK-SHOSHONE INDIAN TRIBE	OWNER
J.R. SIMPLOT COMPANY	OWNER-OPERATOR
FOOD MACHINERY AND CHEMICAL CORP.(FMC)	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT
URANIUM	RECOVERABLE
VANADIUM	RECOVERABLE
FLUORINE	RECOVERABLE
RARE EARTH	RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR IDAHO AND MONTANA IS 352 MILLION METRIC TONS OF ORE AT AN IN SITU GRADE OF 25.6% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: FANTEL, R. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

----------EXPLORATION METHODS----------
SURFACE GEOLOGICAL MAPPING/GEOLOGICAL INFERENCE/ DRILLING/TRENCHING/BEDROCK SAMPLING

YEAR OF INITIAL PRODUCTION: 1946

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: FOLDING; LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

MINERALIZED ZONE:
MINIMUM DEPTH: 0 METERS
AVERAGE THICKNESS: 92 METERS
AVERAGE WIDTH: 100 METERS
STRIKE/DIP: N15W/30E

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 1 METER

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA (MEADE PEAK)
GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MAJOR FAULTING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	ENCLOSES ORE; GANGUE
LIMESTONE	LIES UNDER ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ANALCITE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 7200
UNITS: MT ORE/DAY
DESCRIPTION OF COVER:
SAND, SILT;
MEDIUM-HARD ROCKS
HARDNESS OF ORE:
MEDIUM-HARD ROCKS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE — LOCATION: USA IDAHO
LATITUDE: N 43 02 55 — LONGITUDE: W 112 07 15
PERCENT SHIPPED: 30
METHOD OF TRANSPORTATION: RAIL — DISTANCE (KM): 48
DESTINATION FACILITY: MILL (OFF-SITE) — LOCATION: USA IDAHO (SIMPLOT)
LATITUDE: N 42 54 00 — LONGITUDE: W 112 34 00

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE — LOCATION: USA IDAHO
LATITUDE: N 43 02 55 — LONGITUDE: W 112 07 15
PERCENT SHIPPED: 70
METHOD OF TRANSPORTATION: RAIL — DISTANCE (KM): 48
DESTINATION FACILITY: MILL (OFF-SITE) — LOCATION: USA IDAHO(FMC)
LATITUDE: N 42 54 00 — LONGITUDE: W 112 35 00

BENEFICIATION:
METHOD: PYROMETALLURGICAL — -------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 4000 — SCREEN/CRUSH/CALCINE/GRIND
UNITS: MT ORE/DAY

BENEFICIATION:
METHOD: PYROMETALLURGICAL — ---------- DESCRIPTION OF MILLING ----------
ORE STOCKPILE/SCREEN/CRUSH/BRIQUETTE FORMATION/ INDURATION (CALCINE)

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING, ENGINEERING, V. 30, NO. 1, 1978, P. 29-36.

DAY, R. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET 155, 1973, 63 P.

EMIGH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1958, 60 P.

FOWLER, H.B. MINING ENGINEERING, VOL. 1, NO. 8, 1949.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820: GARRAND CORP, 1975

LI, TA M. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, P. 25-28.

MANSFIELD, G.R. GEOGRAPHY, GEOLOGY, AND MINERAL RESOURCES OF PART OF SOUTHEASTERN IDAHO. USGS PROF. PAPER 152, 1927.

MANSFIELD, G.R. USGS BULL. 713, 1920.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, P. 1046-1048.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 111, 1956. 48 P.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTEN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, INFORMATION CIRCULAR NO. 15, 1974, 33 P.

RULE, A. R. C. E. KIRBY, AND C. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING. V. 30, NO. 1, 1978, P. 37 - 40.

SCHMITT, H. O. ANATOMY OF THE WESTERN PHOSPHATE FIELD, 1967.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 P.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTION REVIEW. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 P.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, P. 45-65

THOMPSON, M. E. FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, P. 107-122

TOWN, J.K. ET AL. US BUREAU OF MINES R.I 6930, 1967.

U.S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CONDA MINE
SEQUENCE NUMBER: 0160290004

NATION: USA STATE: IDAHO
COUNTY: CARIBOU
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 42 DEG 43 MIN 40 SEC
LONGITUDE: W 111 DEG 31 MIN 36 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4730505 EASTING: 456881
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 1920 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE; PATENTED CLAIM

ALTERNATE NAMES
N. TRAIL CANYON
WOODALL MOUNTAIN

OWNERSHIP	STATUS
U. S. GOVT. - BUREAU OF LAND MANAGEMENT	OWNER
J.R. SIMPLOT CO.	OWNER-OPERATOR
U. S. GOVT. - FOREST SERVICE	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT
URANIUM	RECOVERABLE
VANADIUM	RECOVERABLE
FLUORINE	RECOVERABLE
RARE EARTH	RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
INDICATED	65,269,000	10,397,000	75,667,000
INFERRED	73,706,000	34,635,000	108,340,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1975	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	26.5	WT-PCT
2	P205	16.6	WT-PCT
3	P205	25.1	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: MEDIUM PLUS HIGH GRADE ORE (GARRAND)
RECORD 2: LOW GRADE RESOURCE, LOW GRADE ORE ONLY (GARRAND)
RECORD 3: LOW PLUS MEDIUM PLUS HIGH GRADE ORE (GARRAND)

SOURCE FOR RECORDS 1, 2, AND 3:
GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO, FOR U. S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FORESTY. U. S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820, GARRAND CORPORATION, 1975.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF INITIAL PRODUCTION: 1922

EXPLORATION METHODS:
SURFACE GEOLOGICAL MAPPING/GEOLOGICAL INFERENCE/DRILLING/TEST DRIFT/CROSSCUT/TRENCHING/BEDROCK SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

MINERALIZED ZONE:
AVERAGE LENGTH: 2000 METERS
AVERAGE WIDTH: 600 METERS
STRIKE/DIP: N00W/20E

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 1 METER

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA (MEADE PEAK)
GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MAJOR FAULTING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	ENCLOSES ORE; GANGUE
LIMESTONE	LIES UNDER ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

MINE/MILL INFORMATION
CONDA MINE AND WASH PLANT

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 4000 — UNITS: MT ORE/DAY
DESCRIPTION OF COVER: SAND, SILT; MEDIUM-HARD ROCKS — HARDNESS OF ORE: MEDIUM-HARD ROCKS
PERCENT WASTE ROCK: 86
BENCH HEIGHT: 12 METERS — SLOPE OF PIT: 45 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE — LOCATION: U.S.A. IDAHO
LATITUDE: N 42 43 40 — LONGITUDE: W 111 31 36
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK; PIPELINE — DISTANCE (KM): 1; 2.3

BENEFICIATION:
METHOD: WASHING — DESCRIPTION OF MILLING: SCREEN/CRUSH/SCREEN/GRIND/3-STAGE CYCLONE/FILTER/DRY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
WASH PRODUCT	P2O5	80	31	WT-PCT

TRANSPORTATION FOR PRODUCT: WASH PRODUCT
ORIGINATING FACILITY: MILL (ON-SITE) — LOCATION: CONDA WASH PLANT
LATITUDE: N 42 43 00 — LONGITUDE: W 111 42 00
PERCENT SHIPPED: 60
METHOD OF TRANSPORTATION: RAIL — DISTANCE (KM): 109
DESTINATION FACILITY: MILL (OFF-SITE) — LOCATION: POCATELLO CALCINER
LATITUDE: N 42 54 00 — LONGITUDE: W 112 34 00

MINE/MILL INFORMATION
CONDA PRODUCT TO POCATELLO

BENEFICIATION:
METHOD: PYROMETALLURGICAL — DESCRIPTION OF MILLING: CALCINE

PRODUCT	ASSAY FORM	CONCENTRATE GRADE	UNIT
CALCINE	P2O5	35	WT-PCT

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, P. 29-36.

DAY, R. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET 155, 1973, 63 P.

EMICH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1956, 60 P.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST, U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820: GARRAND CORP., 1975.

GULBRANSEN, R.A. ET AL. USGS BULL. 1042-A, 1956.

LI, TA M. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, P. 25-28.

MANSFIELD, G.R., GEOGRAPHY, GEOLOGY, AND MINERAL RESOURCES OF PART OF SOUTHEASTERN IDAHO. USGS PROF. PAPER 152, 1927.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES: ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, P. 1046-1048.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 111, 1956, 48 P.

SERVICE, A. L., AND N. S. PETERSEN. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 P.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

ROLE, A. R., C. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

RUSSELL, T.C. MINING ENGINEERING, VOL. 1, NO. 8, 1949, PP. 279-282

SCHRAFFE, D.F. ANATOMY OF THE WESTERN PHOSPHATE FIELD. 1967, PP. 187.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTION REVIEW. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-65

THOMPSON, M.E. FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122.

U.S GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/ DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES. 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MOUNTAIN FUEL LEASE

SEQUENCE NUMBER: 0160290009

NATION: USA STATE: IDAHO
TYPE OF OPERATION: SURFACE
LATITUDE: N 42 DEG 35 MIN 41 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 2149 METERS
DATUM: SEA LEVEL

COUNTY: CARIBOU
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 111 DEG 17 MIN 23 SEC
NORTHING: 4721189 EASTING: 476248
PRECISION: 500 METERS
PRECISION: 100 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE

OWNERSHIP	STATUS
U. S. GOVT. - FOREST SERVICE	OWNER
BEKER INDUSTRIES CORP.	OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
VANADIUM	PHOSPHATIC SHALE	RECOVERABLE
FLUORITE		RECOVERABLE
RARE EARTH		RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
MEASURED	9,000,000	------	------
INDICATED	------	8,400,000	12,000,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1976	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
3	P2O5	27.6	WT-PCT
	U3O8	0.01	WT-PCT
	V2O5	0.07	WT-PCT
	F	2.76	WT-PCT
	RARE EARTH	0.1	WT-PCT
2	P2O5	19.6	WT-PCT
	U3O8	0.01	WT-PCT
	V2O5	0.07	WT-PCT
	F	1.96	WT-PCT
	RARE EARTH	0.1	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: STRIPPING RATIO = 3.0 CUBIC YARDS WASTE TO 1 TON ORE.
RECORD 2: STRIPPING RATIO = 3.7 CUBIC YARDS OVERBURDEN TO 1 TON ORE/MEDIUM PLUS HIGH GRADE ORE.
RECORD 3: STRIPPING RATIO = 1.6 CUBIC YARDS OVERBURDEN TO 1 TON ORE/LOW PLUS MEDIUM PLUS HIGH GRADE ORE.

SOURCE FOR RECORD 1:
U. S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

SOURCE FOR RECORD 2 AND 3:
GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO, FOR: U. S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U. S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820; GARRAND CORPORATION, 1975.

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MINOR FOLDING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

CHERT	LIES OVER ORE
MUDSTONE	ENCLOSES ORE; GANGUE
SHALE	ENCLOSES ORE; GANGUE
PHOSPHORITE	IS ORE
LIMESTONE	ENCLOSES ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
CALCITE	CARBONATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 29-36.

CRESSMAN, E. R. AND R. A. GULBRANDSEN. GEOLOGY OF THE DRY VALLEY QUADRANGLE, IDAHO. U.S. GEOLOGICAL SURVEY BULL. 1015-I, 1955, PP. 257-270.

DAY, R. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET 155, 1973, 63 PP.

EPIGH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1958, 60 PP.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO, FOR U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST, U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820. GARRAND CORP. 1975.

LI, TA M. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-28.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, PP. 1046-1048.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 111, 1956, 48 PP.

MC KELVEY, V. E., ARMSTRONG, F. C., GULBRANDSEN, R. A., AND CAMPBELL, R. M. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO, 1947-48, PT. 2, U.S. GEOLOGICAL SURVEY, CIRCULAR 301, 1953, PP. 38-43.

MC KELVEY, V. E., F. C. ARMSTRONG, R. A. GULBRANDSEN, AND R. M. CAMPBELL. STRATIGRAPHIC SECTIONS OF PHOSPHORIA FORMATION IN IDAHO, 1947-48, PART II: U. S. GEOLOGICAL SURVEY, TRACE ELEMENTS INVESTIGATIONS REPORT 187, 1953, PP. 34-39

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

RULE, A. R., S. L. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES: MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SERVICE, A. L. AND N. S. PETERSEN. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTORY REVIEW. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-65

THOMPSON, M. E. FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122

U.S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE, FINAL ENVIRONMENTAL IMPACT STATEMENT/ DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO, FOUR VOLUMES, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MAYBE CANYON MINE
SEQUENCE NUMBER: 0160290034

NATION: USA STATE: IDAHO
COUNTY: CARIBOU
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 42 DEG 45 MIN 33 SEC
LONGITUDE: W 111 DEG 18 MIN 29 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4733902 EASTING: 474792
POINT OF REFERENCE: ORE BODY
PRECISION: 500 METERS
ELEVATION: 2316 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE

ALTERNATE NAMES
MAGIE CANYON
MAGIE RIDGE

OWNERSHIP	STATUS
U. S. GOVT. - FOREST SERVICE	OWNER
SEKER CORPORATION	OWNER-OPERATOR
WESTERN FERTILIZER COOPERATIVE	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT
URANIUM	RECOVERABLE
VANADIUM	RECOVERABLE
FLUORINE	RECOVERABLE
RARE EARTH	RECOVERABLE

ESTIMATED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
INDICATED	23,500,000	9,900,000	33,400,000
INFERRED	40,600,000	16,200,000	56,700,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1975	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	28	WT-PCT
2	P2O5	18	WT-PCT
3	P2O5	25	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: MEDIUM PLUS HIGH GRADE ORE
RECORD 2: LOW GRADE RESOURCE, LOW GRADE ORE ONLY
RECORD 3: LOW PLUS MEDIUM PLUS HIGH GRADE ORE

SOURCE FOR RECORD 1, 2, AND 3:
GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U. S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U. S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820: GARRAND CORP.,1975.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

YEAR OF INITIAL PRODUCTION: 1966

----------EXPLORATION METHODS----------
SURFACE GEOLOGICAL MAPPING/GEOLOGICAL INFERENCE/DRILLING/TEST DRIFT/CROSSCUT/TRENCHING/BEDROCK SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

MINERALIZED ZONE:
AVERAGE LENGTH: 8000 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE WIDTH: 100 METERS
STRIKE/DIP: N20W/30E

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 1 METER

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA (MEADE PEAK) GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MAJOR FAULTING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	ENCLOSES ORE; GANGUE
LIMESTONE	LIES UNDER ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 9100
UNITS: MT ORE/DAY
DESCRIPTION OF COVER:
SAND, SILT;
MEDIUM-HARD ROCKS
HARDNESS OF ORE:
MEDIUM-HARD ROCKS
PERCENT WASTE ROCK: 75
SLOPE OF PIT: 45 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE — LOCATION: U.S.A. IDAHO
LATITUDE: N 42 45 33 — LONGITUDE: W 111 18 29
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL — DISTANCE (KM): 26
DESTINATION FACILITY: MILL (OFF-SITE) — LOCATION: BEKER CONDA PLANT
LATITUDE: N 42 44 30 — LONGITUDE: W 111 32 32

BENEFICIATION:
METHOD: PYROMETALLURGICAL — -------DESCRIPTION OF MILLING-------
DESIGN CAPACITY: 7100 — CRUSH/SCREEN/GRIND/CYCLONE/
UNITS: ME ORE/DAY — DRY COARSE FRACTION/CALCINE

PRODUCT	ASSAY FORM	CONCENTRATE GRADE	UNIT
CALCINE	P2O5	31	WT-PCT

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 29-36.

CRESSMAN, E.R. GEOLOGY OF THE DRY VALLEY QUADRANGLE, IDAHO. USGS BULL. 1015-I, 1955.

DAY, R. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET 155, 1973, 63 PP.

ENIGH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1958, 60 PP.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST, U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-82U: GARRAND CORP., 1975.

LI, TA M. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-28.

MANSFIELD, G.R. GEOGRAPHY, GEOLOGY, AND MINERAL RESOURCES OF PART OF SOUTHEASTERN IDAHO. USGS PROF. PAPER 152, 1927.

MARTIN, G. A. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, PP. 1046-1048.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 111, 1956, 48 PP.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

RICHARDS, P.W. GEOLOGY OF THE PHOSPHATE DEPOSITS NORTHEAST OF GEORGETOWN, IDAHO. USGS BULL. 577., 1914.

RIOUX, R.C. GEOLOGIC MAP OF THE UPPER VALLEY QUAD., CARIBOU COUNTY, IDAHO. USGS MAP 6Q-1194, 1975.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN, RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SERVICE, A. L., AND N. S. PETERSEN. AN EVALUATION OF MATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, PP. 107-122 PARTS) TRENDS AND OUTLOOK: U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTION REVIEW: U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-65

THOMPSON, M. E. FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122

U.S GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CHAMP LEASE

SEQUENCE NUMBER: 0160290035

NATION: USA STATE: IDAHO
TYPE OF OPERATION: MINERAL LOCATION
LATITUDE: N 42 DEG 40 MIN 18 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 2073 METERS
DATUM: SEA LEVEL

COUNTY: CARIBOU
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 111 DEG 16 MIN 29 SEC
NORTHING: 4724177 EASTING: 477488
PRECISION: 500 METERS
PRECISION: 500 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE; MINERALS ONLY

OWNERSHIP
U. S. GOVT. - FOREST SERVICE
FEDER INDUSTRIES

STATUS
OWNER
OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	USOS CONTENT	RECOVERABLE
VANADIUM	PHOSPHATIC SHALE	RECOVERABLE
FLUORINE		RECOVERABLE
RARE EARTH		RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3	RECORD 4
MEASURED	3,200,000	------	------	------
INDICATED	------	964,000	633,000	1,597,000
UNITS	MT ORE	MT ORE	MT ORE	MT ORE
YEAR/DATA	1976	1975	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
2	P2O5	26.5	WT-PCT
	U3O8	0.01	WT-PCT
	V2O5	0.07	WT-PCT
	F	2.65	WT-PCT
	RARE EARTH	0.1	WT-PCT
3	P2O5	17.6	WT-PCT
	U3O8	0.01	WT-PCT
	V2O5	0.07	WT-PCT
	F	1.76	WT-PCT
	RARE EARTH	0.1	WT-PCT
4	P2O5	23.0	WT-PCT
	U3O8	0.01	WT-PCT
	V2O5	0.07	WT-PCT
	F	2.30	WT-PCT
	RARE EARTH	0.1	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: STRIPPING RATIO = 2.9 CUBIC YARDS OVERBURDEN TO 1 TON OF ORE; NO GRADES PUBLISHED.
RECORD 2: STRIPPING RATIO = 3.6 CUBIC YARDS OVERBURDEN TO 1 TON OF ORE; MEDIUM & PLUS HIGHER GRADE RESOURCE.
RECORD 3: LOW GRADE RESOURCE.
RECORD 4: STRIPPING RATIO = 2.0 CUBIC YARDS OVERBURDEN TO 1 TON OF ORE; LOW PLUS MEDIUM PLUS HIGH GRADE RESOURCES.

SOURCE FOR RECORD 1:
U. S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

SOURCE FOR RECORD 2, 3, AND 4:
GARRAND, L. J. PHOSPHATE STUDY SOUTHERASTERN IDAHO. FOR: U. S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U. S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820; GARRAND CORPORATION.

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
ORE CONTROLS: FOLDING; FAULTING; BEDDING

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA (MEADE PEAK) GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MAJOR FAULTING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	ENCLOSES ORE; GANGUE
LIMESTONE	LIES UNDER ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
CALCITE	CARBONATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 29-36.

CRESSMAN, E. R., AND R. A. GULBRANDSEN. GEOLOGY OF THE DRY VALLEY QUADRANGLE, IDAHO. U.S. GEOLOGICAL SURVEY BULL. 1015-I, 1955.

DAY, R. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES ANDGEOLOGY, PAMPHLET 155, 1973, 63 PP.

EMIGH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1958, 60 PP.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO, FOR U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST, U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820: GARRAND CORP., 1975.

LI, TA M. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-28.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, PP. 1046-1048.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 111, 1956, 48 PP.

MC KELVEY, V. E., D. F. DAVIDSON, F. W. O'MALLEY, L. E. SMITH, F. C. ARMSTRONG, AND R. P. SHELDON. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO, 1947-48, PT. 1, U.S. GEOLOGICAL SURVEY TRACE ELEMENTS INVESTIGATIONS REPORT 183, 1952, PP. 18-28.

MC KELVEY, V. E., F. C. ARMSTRONG, R. A. GULBRANDSEN, AND R. M. CAMPBELL. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO, 1947-48, PT. 2, U.S. GEOLOGICAL SURVEY, CIRCULAR 301, 1953, PP. 38-43.

MC KELVEY, V. E., F. C. ARMSTRONG, R. A. GULBRANDSEN, AND M. R. CAMPBELL. STRATIGRAPHIC SECTIONS OF PHOSPHORIA FORMATION IN IDAHO, 1947-48, PART II, U.S. GEOLOGICAL SURVEY TRACE ELEMENTS INVESTIGATIONS REPORT 187, 1953, PP. 46-51.

MC KELVEY, V. E., D. F. DAVIDSON, F. W. O'MALLEY, AND L. E. SMITH. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO 1947-48, PT. 1, U.S. GEOLOGICAL SURVEY CIRCULAR 208, 1953, PP. 14-24.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SERVICE, A. L., AND N. S. PETERSEN. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

SERVICE, A. L., AND POPOFF, C. C. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTION REVIEW. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SHELDON, R. P., M. A. WARNER, M. E. THOMPSON, AND H. W. PIERCE. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO, 1949, PART I, U.S. GEOLOGICAL SURVEY TRACE ELEMENTS INVESTIGATIONS REPORT 364, 1953, PP. 15-19.

SHELTON, R. P., M. A. WARNER, M. E. THOMPSON, AND H. W. PIERCE, STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO, 1949, PT. 1, U.S. GEOLOGICAL SURVEY CIRCULAR 304, 1953, PP. 9-13.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-65.

THOMPSON, M.E . FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122.

U.S GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/ DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO, FOUR VOLUMES, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HENRY MINE

SEQUENCE NUMBER: 0160290055

NATION: USA STATE: IDAHO
TYPE OF OPERATION: SURFACE
LATITUDE: N 42 DEG 52 MIN 05 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 2011 METERS
DATUM: SEA LEVEL

COUNTY: CARIBOU
CURRENT STATUS: PRODUCER
LONGITUDE: W 111 DEG 27 MIN 40 SEC
NORTHING: 4746051 EASTING: 462334
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING:
FEDERAL LEASE; STATE LEASE

ALTERNATE NAMES:
NORTH WOOLEY RANGE

OWNERSHIP	STATUS
U. S. GOVT. - BUREAU OF LAND MANAGEMENT	OWNER
STATE OF IDAHO	OWNER
MONSANTO CORPORATION	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT
URANIUM	RECOVERABLE
VANADIUM	RECOVERABLE
FLUORINE	RECOVERABLE
RARE EARTH	RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 14
INDICATED	29,000,000
UNITS	MT ORE
YEAR/DATA	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	28.4	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: VELIUM PLUS HIGH GRADE ORE

SOURCE FOR RECORD 1:
GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U. S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U. S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820; GARRAND CORPORATION.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD: ORE-MINERAL IN PLACE

EXPLORATION METHODS: SURFACE GEOLOGICAL MAPPING/GEOLOGICAL INFERENCE/DRILLING/TRENCHING/BEDROCK SAMPLING

YEAR OF INITIAL PRODUCTION: 1969

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

MINERALIZED ZONE:
- AVERAGE LENGTH: 5500 METERS
- AVERAGE WIDTH: 80 METERS
- MINIMUM DEPTH: 0 METERS
- STRIKE/DIP: N40W/60E

UNCONSOLIDATED MATERIAL:
- AVERAGE THICKNESS: 1 METER

LITHOLOGY:
- NAME OF FORMATION: PHOSPHORIA(MEADE PEAK) GEOLOGIC AGE: PERMIAN
- DEFORMATION DESCRIPTION: MAJOR FAULTING; FOLDING
- RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
- GEOLOGIC AGE: MESOZOIC
- ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	ENCLOSES ORE; GANGUE
LIMESTONE	LIES UNDER ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 2600 UNITS: MT ORE/DAY
DESCRIPTION OF COVER: HARDNESS OF ORE:
SAND, GRAVEL; MEDIUM-HARD ROCKS
MEDIUM-HARD ROCKS
SLOPE OF PIT: 40 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: U.S.A. IDAHO
LATITUDE: N 42 52 05 LONGITUDE: W 111 27 40
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 26
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: SODA SPRINGS
LATITUDE: N 42 42 00 LONGITUDE: W 111 37 00

BENEFICIATION:
METHOD: PYROMETALLURGICAL ---------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 2600 ORE FROM STOCKPILE AT PLANT TO NODULIZING
UNITS: MT ORE/DAY CALCINER/FUSED PRODUCT TO ROLLS/RESCREENED

PRODUCT	ASSAY FORM
P2O5 CALCINES	P2O5

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 29-36.

DAVIDSON D.F., ET AL. USGS CIRCULAR 305, 1953.

DAY, R. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET 155, 1973, 63 PP.

EMIGH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1958, 60 PP.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO, FOR U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST, U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820: GARRAND CORP., 1975.

GULBRANDSEN, R. A., K. P. MC LAUGHLIN, F. S. HUNKALA, AND S. E. CLABAUGH. GEOLOGY OF THE JOHNSON CREEK QUADRANGLE, CARIBOU COUNTY IDAHO. U. S. GEOLOGIC SURVEY BULL. 1042-A, 1956, 23 PP.

LI, TA M. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-28.

MANSFIELD, G.R. GEOGRAPHY, GEOLOGY, AND MINERAL RESOURCES OF PART OF SOUTHEASTERN IDAHO. USGS PROF. PAPER 152, 1927.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES: ECONOMIC GEOLOGY, V. 53, NO. 6, DECEMBER, PP. 1046-1048, 1958.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 111, 1956, 48 PP.

MCKELVEY, V.E. ET AL. USGS CIRCULAR 301, 1953.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SERVICE, A. L., AND N. S. PETERSEN. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTION REVIEW. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-65.

THOMPSON, M.E . FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122.

U. S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE, 1978, FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: WORLEY VALLEY MINE
SEQUENCE NUMBER: 0160290060

NATION: USA STATE: IDAHO
COUNTY: CARIBOU
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 42 DEG 44 MIN 52 SEC
LONGITUDE: W 111 DEG 24 MIN 28 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4741926 EASTING: 466670
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 2172 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE; FEE OWNERSHIP

ALTERNATE NAMES:
LITTLE LONG VALLEY (UNIT #3)
BLACKFOOT NARROWS (UNIT #1)

OWNERSHIP	STATUS
U. S. GOVT. - FOREST SERVICE	OWNER
U. S. GOVT. - BUREAU OF LAND MANAGEMENT	OWNER
STAUFFER CHEMICAL COMPANY	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT
URANIUM	RECOVERABLE
VANADIUM	RECOVERABLE
FLUORINE	RECOVERABLE
RARE EARTH	RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
INDICATED	16,000,000	1,000,000	17,000,000
INFERRED	11,000,000	2,000,000	13,000,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1975	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	27	WT-PCT
2	P2O5	17	WT-PCT
3	P2O5	26	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: MEDIUM PLUS HIGH GRADE ORE
RECORD 2: LOW GRADE RESOURCE, LOW GRADE ORE ONLY
RECORD 3: LOW PLUS MEDIUM PLUS HIGH GRADE ORE

SOURCE FOR RECORD 1, 2, AND 3:
GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U. S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST, U. S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820: GARRAND CORP., 1975.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD: ORE-MINERAL IN PLACE
EXPLORATION METHODS: SURFACE GEOLOGICAL MAPPING/GEOLOGICAL INFERENCE/DRILLING/TRENCHING/BEDROCK SAMPLING
YEAR OF INITIAL PRODUCTION: 1955

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

MINERALIZED ZONE:
AVERAGE LENGTH: 4000 METERS
AVERAGE WIDTH: 80 METERS
MINIMUM DEPTH: 0 METERS
STRIKE/DIP: N40W/60E

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 1 METER

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA (MEADE PEAK) GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MAJOR FAULTING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	ENCLOSES ORE; GANGUE
LIMESTONE	LIES UNDER ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 2000 UNITS: MT ORE/DAY
DESCRIPTION OF COVER:
SAND, SILT;
MEDIUM-HARD ROCKS
HARDNESS OF ORE:
MEDIUM-HARD ROCKS
SLOPE OF PIT: 45 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: WOOLEY VALLEY MINE
LATITUDE: N 42 49 52 LONGITUDE: W 111 24 28
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 160
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: LEEFE WYO.
LATITUDE: N 42 00 00 LONGITUDE: W 111 00 00

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: WOOLEY VALLEY MINE
LATITUDE: N 42 49 52 LONGITUDE: W 111 24 28
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 560
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: SILVER BOW MONT.
LATITUDE: N 46 00 00 LONGITUDE: W 112 30 00

BENEFICIATION:
METHOD: WASHING

---------- DESCRIPTION OF MILLING -------
ORE TO SCREENS/OVERSIZE TO HAMRMILL/
UNDER TO 10M SCREENS/10M OVER TO ROD MILL/
ROD&10M UNDERSIZE TO CYCLONE/CYCLONE/
UNDERSIZE TO CALCINE

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 29-36.

DAY, R. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY, PHAMPHLET 155, 1973, 63 PP.

EMIGH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1958, 60 PP.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. FC-820: GARRAND CORP., 1975.

LI, TA M. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-28.

MANSFIELD, G.R. GEOGRAPHY, GEOLOGY, AND MINERAL RESOURCES OF PART OF SOUTHEASTERN IDAHO. USGS PROF. PAPER 152, 1927.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, PP. 1046-1048.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 111, 1956, 48 PP.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SERVICE, A. L., AND N. S. PETERSEN, AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTION REVIEW. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

THOMPSON, M.E . FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122

U.S GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO, FOUR VOLUMES, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: RASMUSSEN RIDGE MINE SITE (STAUFFER)
SEQUENCE NUMBER: 0160290062

NATION: USA STATE: IDAHO
COUNTY: CARIBOU
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 42 DEG 52 MIN 14 SEC
LONGITUDE: W 111 DEG 22 MIN 50 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4746295 EASTING: 468915
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 2075 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE; PATENTED CLAIM

OWNERSHIP	STATUS
U.S. GOVT. - FOREST SERVICE	OWNER
STAUFFER CHEMICAL COMPANY	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT
URANIUM	RECOVERABLE
VANADIUM	RECOVERABLE
FLUORINE	RECOVERABLE
RARE EARTH	RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3	RECORD 4
MEASURED	14,510,000	------	------	------
INDICATED	------	18,305,000	2,009,000	20,314,000
UNITS	MT ORE	MT ORE	MT ORE	MT ORE
YEAR/DATA	1978	1975	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	27	WT-PCT
2	P2O5	27.3	WT-PCT
3	P2O5	17.2	WT-PCT
4	P2O5	26.2	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: STRIPPING RATIO = 3.4 METRIC TONS WASTE TO 1 METRIC TON ORE.
RECORD 2: STRIPPING RATIO = 3.88 CUBIC YARDS WASTE TO 1 METRIC TON ORE (MEDIUM PLUS HIGH GRADE).
RECORD 3: LOW GRADE RESOURCE, LOW GRADE ORE ONLY.
RECORD 4: STRIPPING RATIO = 3.4 CUBIC YARDS WASTE TO 1 METRIC TON ORE (LOW PLUS MEDIUM PLUS HIGH GRADE).

SOURCE FOR RECORD 1:
U.S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

SOURCE FOR RECORDS 2, 3, AND 4:
GARRAND, L. J. PHOSPHATE SURVEY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820, GARRAND CORP., 1975.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

----------EXPLORATION METHODS----------
SURFACE GEOLOLOGIC MAPPING/AERIAL PHOTOGRAPHY/ TRENCHING/BEDROCK SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

MINERALIZED ZONE:
STRIKE DIP: N30W/40E

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA (MEADE PEAK) GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MINOR FOLDING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	ENCLOSES ORE; GANGUE
LIMESTONE	LIES UNDER ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KACLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
CALCITE	CARBONATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 29-36.

DAVIDSON, D.F. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1949, PT. 2: USGS CIRC. 305, 1953.

DAY, R. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD: IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET 155, 1973, 63 PP.

ELMICH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1958, 60 PP.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820: GARRAND CORP., 1975.

LI, TA M. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-28.

MCKELVEY, V.E. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-1948, PT. 2, USGS CIRC. 301, 1953.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 111, 1956, 48 PP.

MANSFIELD, G.R. GEOGRAPHY, GEOLOGY, AND MINERAL RESOURCES OF PART OF SOUTHEASTERN IDAHO. USGS PROF. PAPER 152, 1927.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, PP. 1046-1048, 1958.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

RIDDY, R.L. GEOLOGIC MAP OF THE UPPER VALLEY QUAD., CARIBOU COUNTY, IDAHO. USGS MAP GQ-1194, 1975.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6861, 1966, 201 PP.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTORY REVIEW. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

SERVICE, A. L., AND N. S. PETERSEN, AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-65.

THOMPSON, M. E. FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122.

U.S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SMOKY CANYON LEASE

SEQUENCE NUMBER: 0160290079

NATION: USA STATE: IDAHO
TYPE OF OPERATION: SURFACE
LATITUDE: N 42 DEG 42 MIN 30 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 2070 METERS
DATUM: SEA LEVEL

COUNTY: CARIBOU
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 111 DEG 07 MIN 47 SEC
NORTHING: 4728219 EASTING: 489376
PRECISION: 500 METERS
PRECISION: 100 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE

ALTERNATE NAMES
AREA A, CROW CREEK NE
AREA C, 35 THRU 48E, STEWART FLAT

OWNERSHIP
U.S. GOVT. - FOREST SERVICE
J.R. SIMPLOT CO.

STATUS
OWNER
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U308 CONTENT	RECOVERABLE
VANADIUM	PHOSPHATIC SHALE	RECOVERABLE
FLUORINE		RECOVERABLE
RARE EARTH		RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
MEASURED	54,000,000	------	------
INDICATED	------	------	57,000,000
UNDIFFERENTIATED	------	54,000,000	------
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1980	1980	1975

	RECORD 4	RECORD 5	RECORD 6
INDICATED	57,000,000	95,000,000	76,000,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1975	1975	1975

	RECORD 7	RECORD 8
UNDIFFERENTIATED	48,000,000	125,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
3	P205	27.6	WT-PCT
	U308	0.01	WT-PCT
	V205	0.07	WT-PCT
	F	2.76	WT-PCT
	RARE EARTH	0.1	WT-PCT
4	P205	15.5	WT-PCT
	U308	0.01	WT-PCT
	V205	0.07	WT-PCT
	F	1.55	WT-PCT
	RARE EARTH	0.1	WT-PCT
5	P205	22.9	WT-PCT
	U308	0.01	WT-PCT
	V205	0.07	WT-PCT
	F	2.29	WT-PCT
	RARE EARTH	0.1	WT-PCT
6	P205	27.6	WT-PCT
	U308	0.01	WT-PCT
	V205	0.07	WT-PCT
	F	2.76	WT-PCT
	RARE EARTH	0.1	WT-PCT
7	P205	15.5	WT-PCT
	U308	0.01	WT-PCT
	V205	0.07	WT-PCT
	F	1.55	WT-PCT
	RARE EARTH	0.1	WT-PCT
8	P205	22.9	WT-PCT
	U308	0.01	WT-PCT
	V205	0.07	WT-PCT
	F	2.29	WT-PCT
	RARE EARTH	0.1	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: STRIPPING RATIO = 3 CUBIC YARDS WASTE TO 1 TON OF ORE; NO ASSAY GIVEN.
RECORD 2: NO STRIPPING RATIO AND NO ASSAY GIVEN.
RECORD 3: STRIPPING RATIO = 2.8 YARDS WASTE TO 1 TON ORE (MEDIUM PLUS HIGHER GRADES).
RECORD 4: LOW GRADE - DISCARDED WHEN CALCULATING RESOURCE IN R-REC-3.
RECORD 5: STRIPPING RATIO = 1.6 CUBIC YARDS WASTE TO 1 TON ORE (LOW PLUS MEDIUM PLUS HIGHER GRADE).
RECORD 6: STRIPPING RATIO = 3.8 CUBIC YARDS WASTE TO 1 TON ORE (MEDIUM PLUS HIGHER GRADES).
RECORD 7: LOW GRADE - DISCARDED WHEN CALCULATING RESOURCE IN R-REC-6.
RECORD 8: STRIPPING RATIO = 2.1 CUBIC YARDS WASTE TO 1 TON ORE (LOW PLUS MEDIUM PLUS HIGHER GRADE).

SOURCE FOR RECORD 1:

U.S. FOREST SERVICE, U.S. GEOLOGICAL SURVEY, AND THE J. R. SIMPLOT COMPANY. ENVIRONMENTAL IMPACT STATEMENT FACT SHEET - SCOPE OF WORK, SMOKY CANYON MINE, IDAHO. MINE PLAN, 1980.

SOURCE FOR RECORD 2:
JOB SERVICE. POCATELLA EMPLOYMENT, VOL. 14, NO. 5, 1980, PP. 2.

SOURCE FOR RECORDS 3, 4, 5, 6, 7, AND 8:
GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820, GARRAND CORP., 1975.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

----------EXPLORATION METHODS----------
GEOLOGICAL INFERENCE/SURFACE GEOLOGIC MAPPING/ TRENCHING/BEDROCK SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MINOR FOLDING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

CHERT	LIES OVER ORE
MUDSTONE	ENCLOSES ORE; GANGUE
SHALE	ENCLOSES ORE; GANGUE
PHOSPHORITE	IS ORE
LIMESTONE	ENCLOSES ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
CALCITE	CARBONATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 29-36.

DAY, R. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET 155, 1973, 63 PP.

EMIGH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPLET NO. 114, 1958, 60 PP.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820: GARRAND CORP, 1975.

JOB SERVICE. POCATELLA EMPLOYMENT, VOL. 14, NO. 5, 1980, PP.2

LI, TA M. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-28.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPLET NO. 111, 1956, 42 PP.

MANSFIELD, G. R. GEOGRAPHY, GEOLOGY, AND MINERAL RESOURCES OF SOUTHEASTERN IDAHO. U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 152, 1927.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, PP. 1046-1048.

MONTGOMERY, K. M., AND T. M. CHENEY. GEOLOGY OF THE STEWART FLAT QUADRANGLE CARIBOU COUNTY, IDAHO. U.S. GEOLOGICAL SURVEY BULLETIN 1217, 1967.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEAST IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

RULE, A. R., C. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SERVICE, A. L., AND N. S. PETERSEN. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTORY REVIEW. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

SHELDON, R. P., M. A. WARNER, M. E. THOMPSON, AND H. W. PIERCE. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1949, PT. 1, U.S. GEOLOGICAL SURVEY CIRCULAR 304, 1953.

SHELDON, R. P., M. A. WARNER, M. E. THOMPSON, AND H. W. PIERCE. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1949, PART 1, U.S. GEOLOGICAL SURVEY TRACE ELEMENTS INVESTIGATIONS REPORT 364, 1953, PP. 10-15.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-65.

THOMPSON, M. E. FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION: U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122.

U.S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND U.S. FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

U.S. FOREST SERVICE, U.S. GEOLOGICAL SURVEY, AND THE J. R. SIMPLOT COMPANY. ENVIRONMENTAL IMPACT STATEMENT FACT SHEET - SCOPE OF WORK, SMOKY CANYON MINE, IDAHO MINE PLAN, 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: TRAIL CREEK LEASE
SEQUENCE NUMBER: 0160290160

NATION: USA STATE: IDAHO
COUNTY: CARIBOU
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 42 DEG 44 MIN 11 SEC
LONGITUDE: W 111 DEG 25 MIN 15 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4731412 EASTING: 465551
ELEVATION: 2073 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE; STATE LEASE;
PATENTED CLAIM

OWNERSHIP	STATUS
U. S. GOVT. - BUREAU OF LAND MANAGEMENT	OWNER
STATE OF IDAHO	OWNER
MONSANTO CO.	OWNER-OPERATOR
U. S. GOVT. - FOREST SERVICE	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
VANADIUM	PHOSPHATIC SHALE	RECOVERABLE
FLUORINE		RECOVERABLE
RARE EARTH		RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3	RECORD 4
MEASURED	27,000,000	------	------	------
INDICATED	------	42,000,000	12,000,000	54,000,000
UNITS	MT ORE	MT ORE	MT ORE	MT ORE
YEAR/DATA	1978	1975	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
2	P2O5	24.7	WT-PCT
	U3O8	0.01	WT-PCT
	V2O5	0.07	WT-PCT
	F	2.47	WT-PCT
	RARE EARTH	0.1	WT-PCT
3	P2O5	19.3	WT-PCT

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
3	U3O8	0.01	WT-PCT
	V2O5	0.07	WT-PCT
	F	1.93	WT-PCT
	RARE EARTH	0.1	WT-PCT
4	P2O5	23.5	WT-PCT
	U3O8	0.01	WT-PCT
	V2O5	0.07	WT-PCT
	F	2.35	WT-PCT
	RARE EARTH	0.1	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: STRIPPING RATIO = 3.0 CUBIC YARDS WASTE TO 1 TON ORE.
RECORD 2: STRIPPING RATIO = 3.3 CUBIC YARDS OVERBURDEN TO 1 TON ORE; MEDIUM PLUS HIGH GRADE ORE.
RECORD 3: LOW GRADE RESOURCE.
RECORD 4: STRIPPING RATIO = 1.6 CUBIC YARDS OVERBURDEN TO 1 TON ORE; LOW PLUS MEDIUM + HIGH GRADE ORE.

SOURCE FOR RECORD 1:
U. S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

SOURCE FOR RECORD 2, 3, AND 4:
GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U. S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820; GARRAND CORPORATION, 1975.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

-------EXPLORATION METHODS-------
SURFACE GEOLOGIC MAPPING/
DRILLING/TRENCHING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MINOR FOLDING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

CHERT	LIES OVER ORE
MUDSTONE	ENCLOSES ORE; GANGUE
SHALE	ENCLOSES ORE; GANGUE
PHOSPHORITE	IS ORE
LIMESTONE	ENCLOSES ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
CALCITE	CARBONATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 29-36.

DAY, R. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY. PAMPHLET 155, 1973, 63 PP.

EMIGH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY. PAMPHLET NO. 114, 1958, 60 PP.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO.50-820. GARRAND CORP., 1975.

GULBRANDSEN, R. A., K. P. MC LAUGHLIN, F. S. HUNKALA, AND S. E. CLABAUGH. GEOLOGY OF THE JOHNSON CREEK QUADRANGLE, CARIBOU COUNTY IDAHO. U. S. GEOLOGIC SURVEY BULL. 1042-A, 1956, 23 PP.

LI, TA M. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-28.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, PP. 1046-1048.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 111, 1956, 48 PP.

MC KELVEY, V. E., D. F. DAVIDSON, F. W. O'MALLEY, AND L. E. SMITH. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO 1947-48, PT. I: U.S. GEOLOGICAL SURVEY CIRCULAR 208, 1953, PP. 14-24.

MC KELVEY, V. E., D. F. DAVIDSON, F. W. O'MALLEY, L. E. SMITH, F. C. ARMSTRONG, AND R. P. SHELDON. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-48, PT. 1. U.S. GEOLOGICAL SURVEY TRACE ELEMENTS INVESTIGATIONS REPORT 183, 1952, PP. 18-28.

O'MALLEY, F. W., D. F. DAVIDSON, R. A. HOPPIN, AND R. P. SHELDON. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-48, PT. III. U. S. GEOLOGICAL SURVEY CIRCULAR 262, 1953, PP. 24-26.

O'MALLEY, F. W., D. F. DAVIDSON, R. A. HOPPIN, AND R. P. SHELDON. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-48, PT. III: U. S. GEOLOGICAL SURVEY TRACE ELEMENTS INVESTIGATIONS REPORT 188, 1953, PP. 20-22.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

RULE, A. W., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES: MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S.BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SERVICE, A. L., AND N. S. PETERSEN. AN EVALUATION OFTHE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVEPARTS), 1. INTRODUCTION REVIEW. U.S. BUREAU OF MINES,REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-65

THOMPSON, M.E . FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122

U.S GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NORTH HENRY MINE

SEQUENCE NUMBER: 0160290161

NATION: USA STATE: IDAHO
COUNTY: CARIBOU
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 42 DEG 54 MIN 18 SEC
LONGITUDE: W 111 DEG 30 MIN 24 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4750174 EASTING: 458637
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE; STATE LEASE; PATENTED CLAIM

OWNERSHIP	STATUS
U. S. GOVT. - BUREAU OF LAND MANAGEMENT	OWNER
STATE OF IDAHO	OWNER
MONSANTO COMPANY	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT
URANIUM	RECOVERABLE
VANADIUM	RECOVERABLE
FLUORINE	RECOVERABLE
RARE EARTH	RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
INDICATED	7,600,000	3,300,000	10,900,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1975	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	28.1	WT-PCT
2	P205	17	WT-PCT
3	P205	27.4	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: MEDIUM PLUS HIGH GRADE ORE
RECORD 2: LOW GRADE RESOURCE, LOW GRADE ORE ONLY
RECORD 3: LOW PLUS MEDIUM PLUS HIGH GRADE ORE

SOURCE FOR RECORD 1, 2, AND 3:
GARRAND, L. J. PHOSPHATE STUDY SOUTHERASTERN IDAHO. FOR: U. S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U. S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820; GARRAND CORPORATION.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

----------EXPLORATION METHODS----------
SURFACE GEOLOGICAL MAPPING/GEOLOGICAL INFERENCE/DRILLING/TRENCHING/BEDROCK SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

MINERALIZED ZONE:
AVERAGE LENGTH: 2400 METERS
AVERAGE WIDTH: 80 METERS
MINIMUM DEPTH: 0 METERS
STRIKE/DIP: N40W/60E

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 1 METER

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA (MEADE PEAK) GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MAJOR FAULTING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	ENCLOSES ORE; GANGUE
LIMESTONE	LIES UNDER ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

MINE/MILL INFORMATION

HENRY MINE/SODA SPRGS CALCINER

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 2600
UNITS: MT ORE/DAY
DESCRIPTION OF COVER:
SAND, GRAVEL;
MEDIUM-HARD ROCKS
HARDNESS OF ORE:
MEDIUM-HARD ROCKS
SLOPE OF PIT: 40 DEGREES

BENEFICIATION:
METHOD: PYROMETALLURGICAL
DESIGN CAPACITY: 2600
UNITS: MT ORE/DAY

---------- DESCRIPTION OF MILLING -------
ORE FROM STOCKPILE TO SCREEN/PLUS MATERIAL DISCARDED/MINUS MATERIAL TO CALCINE/ CALCINE PRODUCT CRUSHED/SIZED

PRODUCT	ASSAY FORM
P205 CALCINE	P205

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 29-36.

DAY, R. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET 155, 1973, 63 PP.

EMICH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1958, 60 PP.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST, U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820. GARRAND CORP., 1975.

LI, TA M. SOUTHEASTEPN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-28.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, PP. 1046-1048.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 111, 1956, 48 PP.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY. INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SERVICE, A. L., AND N. S. PETERSEN. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTION REVIEW. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-65

THOMPSON, M.E . FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122

U.S GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/ DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CALDWELL CANYON SITE
SEQUENCE NUMBER: 0160290162

NATION: USA
STATE: IDAHO
COUNTY: CARIBOU
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 42 DEG 44 MIN 12 SEC
LONGITUDE: W 111 DEG 22 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4731423 EASTING: 469985
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 1926 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE; STATE LEASE;
PATENTED CLAIM

OWNERSHIP	STATUS
U. S. GOVT. - FOREST SERVICE	OWNER
U. S. GOVT. - BUREAU OF LAND MANAGEMENT	OWNER
STATE OF IDAHO	OWNER
MONSANTO COMPANY	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U308 CONTENT	RECOVERABLE
VANADIUM	PHOSPHATIC SHALE	RECOVERABLE
FLUORINE		RECOVERABLE
RARE EARTH		RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3	RECORD 4
MEASURED	11,000,000	------	------	------
INDICATED	------	15,000,000	9,000,000	24,000,000
UNITS	MT ORE	MT ORE	MT ORE	MT ORE
YEAR/DATA	1978	1975	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
2	P205	25.5	WT-PCT
	U308	0.01	WT-PCT
	V205	0.07	WT-PCT
	F	2.6	WT-PCT
	RARE EARTH	0.1	WT-PCT

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
3	P2O5	19.0	WT-PCT
	U3O8	0.01	WT-PCT
	V2O5	0.07	WT-PCT
	F	1.9	WT-PCT
	RARE EARTH	0.1	WT-PCT
4	P2O5	23.1	WT-PCT
	U3O8	0.01	WT-PCT
	V2O5	0.07	WT-PCT
	F	2.3	WT-PCT
	RARE EARTH	0.1	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: STRIPPING RATIO = 3.1 CUBIC YARDS OVERBURDEN TO 1 TON ORE.
RECORD 2: STRIPPING RATIO = 3.4 CUBIC YARDS OVERBURDEN TO 1 TON ORE; MEDIUM PLUS HIGH GRADE ORE.
RECORD 3: LOW GRADE RESOURCE.
RECORD 4: STRIPPING RATIO = 2.0 CUBIC YARDS OVERBURDEN TO 1 TON ORE; LOW PLUS MEDIUM PLUS HIGH GRADE ORE.

SOURCE FOR RECORD 1:
U. S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

SOURCE FOR RECORDS 2, 3, AND 4:
GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U. S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST, U. S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820: GARRAND CORPORATION, 1975.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD: PRE-MINERAL IN PLACE

EXPLORATION METHODS: SURFACE GEOLOGIC MAPPING/TRENCHING/DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MINOR FOLDING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

CHERT	LIES OVER ORE
MUDSTONE	ENCLOSES ORE; GANGUE
SHALE	ENCLOSES ORE; GANGUE
PHOSPHORITE	IS ORE
LIMESTONE	ENCLOSES ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
CALCITE	CARBONATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 29-36.

CRESSMAN, E. R., AND R. A. GULBRANDSEN. GEOLOGY OF THE DRY VALLEY QUADRANGLE, IDAHO. U. S. GEOLOGICAL SURVEY BULL. 1015-I, 1955, PP. 257-270.

DAY, R. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET 155, 1973, 63 PP.

EMIGH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1958, 60 PP.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820. GARRAND CORP., 1975.

GULBRANDSEN, R. A., K. P. MC LAUGHLIN, F. S. HUNKALA, AND S. E. CLABAUGH. GEOLOGY OF THE JOHNSON CREEK QUADRANGLE, CARIBOU COUNTY IDAHO. U. S. GEOLOGIC SURVEY BULL. 1042-A, 1956, PP. 1-21.

LI, T. M. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-26.

MARTIN, C. W. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, PP. 1046-1048.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY. PAMPHLET NO. 111, 1956, 48 PP.

MC KELVEY, V. E., D. F. DAVIDSON, F. W. O'MALLEY, AND L. E. SMITH. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO, 1947-48, PT. 1. U.S. GEOLOGICAL SURVEY CIRCULAR 208, 1953, PP. 14-24.

MC KELVEY, V. E., D. F. DAVIDSON, F. W., O'MALLEY, L. E. SMITH, F. C. ARMSTRONG, AND R. P. SHELDON. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-48, PT. 1. U.S. GEOLOGICAL SURVEY TRACE ELEMENTS INVESTIGATIONS REPORT 183, 1952, PP. 18-28.

O'MALLEY, F. W., D. F. DAVIDSON, R. A. HOPPIN, AND R. P. SHELDON. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-48, PT. III. U. S. GEOLOGICAL SURVEY CIRCULAR 262, 1953, PP. 24-26.

O'MALLEY, F. W., D. F. DAVIDSON, R. A. HOPPIN, R. P. SHELDON. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-48, PT. III. U. S. GEOLOGICAL SURVEY TRACE ELEMENTS INVESTIGATIONS REPORT 188, 1953, PP. 20-22.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY. INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

POLE, A. P., D. E. KIRBY, AND C. C. DAHLIN, RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SERVICE, A. L., AND N. S. PETERSEN. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTION REVIEW. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-66.

THOMPSON, M.E . FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122.

U.S GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DIAMOND CREEK MINE SITE(ALUMET) SEQUENCE NUMBER: 0160290163

NATION: USA STATE: IDAHO
TYPE OF OPERATION: SURFACE
LATITUDE: N 42 DEG 47 MIN 17 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 2020 METERS
DATUM: SEA LEVEL

COUNTY: CARIBOU
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 111 DEG 15 MIN 12 SEC
NORTHING: 4737095 EASTING: 479279
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE; PATENTED CLAIM

OWNERSHIP
U. S. GOVT. - FOREST SERVICE
ALUMET CORPORATION

STATUS
OWNER
OWNER-OPERATOR

COMMODITY
PHOSPHATE
URANIUM
VANADIUM
FLUORINE
RARE EARTH

MARKETABILITY
PRIMARY PRODUCT
RECOVERABLE
RECOVERABLE
RECOVERABLE
RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3	RECORD 4
MEASURED	54,430,000	------	------	------
INDICATED	------	2,127,000	259,000	2,386,000
UNITS	MT ORE	MT ORE	MT ORE	MT ORE
YEAR/DATA	1978	1975	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
2	P2O5	27.2	WT-PCT
3	P2O5	17.2	WT-PCT
4	P2O5	26.1	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: STRIPPING RATIO = 8.3 MT WASTE TO 1 MT ORE; NO ASSAY DATA.
RECORD 2: STRIPPING RATIO = 3.3 CUBIC YARDS WASTE TO 1 MT ORE (MEDIUM PLUS HIGH GRADE.
RECORD 3: LOW GRADE RESOURCE, LOW GRADE ORE ONLY.
RECORD 4: STRIPPING RATIO = 2.9 CUBIC YARDS WASTE TO 1 MT ORE (LOW PLUS MEDIUM PLUS HIGH GRADE).

SOURCE FOR RECORD 1:
U.S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

SOURCE FOR RECORDS 2, 3, AND 4:
GARRAND, L. J. PHOSPHATE SURVEY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820, GARRAND CORP., 1975.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:	----------EXPLORATION METHODS----------
ORE-MINERAL IN PLACE	SURFACE GEOLOLOGIC MAPPING/AERIAL PHOTOGRAPHY/ DRILLING/TRENCHING/BEDROCK SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA (MEADE PEAK) GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MINOR FOLDING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	ENCLOSES ORE; GANGUE
LIMESTONE	LIES UNDER ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	PHANERITIC-MEDIUM
QUARTZ	FORMS OF SIO2	APHANITIC
SERICITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
ORTHOCLASE	SILICATES	APHANITIC
CHALCEDONY	FORMS OF SIO2	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 29-36.

DAY, A. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET 155, 1973, 63 PP.

LE UOTG, F. H. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSHPATE RESOURCES, U.S., AND FREE WORLD. OPEN FILE REPORT, DEPARTMENT OF ENERGY, 1979.

RYAN, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1958, 60 PP.

GARRARD, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820: GARRARD CORPP, 1975.

LI, TA M. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-28.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY. PAMPHLET NO. 111, 1956, 48 PP.

MANSFIELD, G.R. GEOGRAPHY, GEOLOGY, AND MINERAL RESOURCES OF PART OF SOUTHEASTERN IDAHO. USGS PROF. PAPER 152, 1927.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, PP. 1046-1048.

MINING ENGINEERING. ALUMET'S DIAMOND CREEK READIES FOR PRODUCTION. JAN 1978, PP 35-36.

O'MALLEY, F.W. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-48, PART 3. USGS CIRC. 262, 1953.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

RICHARDS, R.W. GEOLOGY OF THE PHOSPHATE DEPOSITS NORTHEAST OF GEORGETOWN, IDAHO. USGS BULL 577, 1914.

RIOUX, R.L. GEOLOGIC MAP OF THE UPPER VALLEY QUAD., CARIBOU COUNTY, IDAHO. USGS MAP GQ-1194, 1975.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SHELDON, R.P. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1949, PART 4. USGS CIRC. 304, 1953.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTORY REVIEW: U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

SERVICE, A. L., N. S. AND PETERSEN. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-65.

THOMPSON, M. E. FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122.

U.S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/ DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DRY VALLEY MINE SITE (FMC) SEQUENCE NUMBER: 0160290165

NATION: USA STATE: IDAHO
TYPE OF OPERATION: SURFACE
LATITUDE: N 42 DEG 44 MIN 04 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 2000 METERS
DATUM: SEA LEVEL

COUNTY: CARIBOU
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 111 DEG 20 MIN 16 SEC
NORTHING: 4731166 EASTING: 472349
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE; PATENTED CLAIM
STATE LEASE

OWNERSHIP	STATUS
U. S. GOVT. - FOREST SERVICE	OWNER
FMC CORPORATION	OWNER-OPERATOR
U. S. GOVT. - BUREAU OF LAND MANAGEMENT	OWNER
STATE OF IDAHO	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT
URANIUM	RECOVERABLE
VANADIUM	RECOVERABLE
FLUORINE	RECOVERABLE
RARE EARTH	RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3	RECORD 4
MEASURED	39,920,000	------	------	------
INDICATED	------	7,342,000	3,994,000	11,336,000
UNITS	MT ORE	MT ORE	MT ORE	MT ORE
YEAR/DATA	1978	1975	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
2	P2O5	28.8	WT-PCT
3	P2O5	16.8	WT-PCT
4	P2O5	24.6	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: STRIPPING RATIO = 3.3 METRIC TONS WASTE TO 1 METRIC TON ORE; NO ASSAY DATA
RECORD 2: STRIPPING RATIO =3.85 CUBIC YARDS WASTE TO 1 METRIC TON ORE (MEDIUM PLUS HIGH GRADE).
RECORD 3: LOW GRADE RESOURCE, LOW GRADE ORE ONLY.
RECORD 4: STRIPPING RATIO = 2.23 CUBIC YARDS WASTE TO 1 METRIC TON ORE (LOW PLUS MEDIUM PLUS HIGH GRADE).

SOURCE FOR RECORD 1:
U.S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

SOURCE FOR RECORDS 2, 3, AND 4:
GARRAND, L. J. PHOSPHATE SURVEY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820, GARRAND CORP., 1975.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD: ORE-MINERAL IN PLACE

EXPLORATION METHODS: SURFACE GEOLOLOGIC MAPPING/AERIAL PHOTOGRAPHY/DRILLING/TRENCHING/BEDROCK SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

GEOMETRY:
TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA (MEADE PEAK) GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MINOR FOLDING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	ENCLOSES ORE; GANGUE
LIMESTONE	LIES UNDER ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
CALCITE	CARBONATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

BIBLIOGRAPHY RECORDS

CARTER, RUSSELL A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 29-36.

CRESSMAN, E.R. GEOLOGY OF THE DRY VALLEY QUADRANGLE, IDAHO. USGS BULL 1015-I, 1955.

DAY, H. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET 155, 1973, 63 PP.

LEIGH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1958, 60 PP.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820. GARRAND CORP., 1975.

LI, T. Y. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-28.

MANSFIELD, G.R. GEOGRAPHY, GEOLOGY, AND MINERAL RESOURCES OF PART OF SOUTHEASTERN IDAHO. USGS PROF. PAPER 152, 1927.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, PP. 1046-1048.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY. PAMPHLET NO. 111, 1956, 48 PP.

MCKELVEY, V.E. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-48, PART I. USGS CIRC. 208, 1953.

O'MALLEY, F.W. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-48, PART 3. USGS CIRC. 262, 1953.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY. INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

RICHARDS, R.W. GEOLOGY OF THE PHOSPHATE DEPOSITS NORTHEAST OF GEORGETOWN, IDAHO. USGS BULL 577, 1914.

RIOUX, R.L. GEOLOGIC MAP OF THE UPPER VALLEY QUAD., CARIBOU COUNTY, IDAHO. USGS MAP GQ-1194, 1975.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTORY REVIEW: U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

SERVICE, A. L., AND N. S. PETERSEN. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK: U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-65.

THOMPSON, M. E. FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION: U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122.

U.S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HUSKY NO. 1 LEASE
SEQUENCE NUMBER: 0160290166

NATION: USA STATE: IDAHO
COUNTY: CARIBOU
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 42 DEG 41 MIN 37 SEC
LONGITUDE: W 111 DEG 14 MIN 35 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4726605 EASTING: 480090
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 2438 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE

OWNERSHIP	STATUS
U. S. GOVT. - FOREST SERVICE	OWNER
AMAX INDUSTRIES CORPORATION	OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
VANADIUM	PHOSPHATIC SHALE	RECOVERABLE
FLUORINE		RECOVERABLE
RARE EARTH		RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3	RECORD 4
MEASURED	47,000,000	------	------	------
INDICATED	------	17,000,000	12,000,000	29,000,000
UNITS	MT ORE	MT ORE	MT ORE	MT ORE
YEAR/DATA	1978	1975	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
2	P2O5	26.1	WT-PCT
	U3O8	0.01	WT-PCT
	V2O5	0.07	WT-PCT
	F	2.61	WT-PCT
	RARE EARTH	0.1	WT-PCT
3	P2O5	17.5	WT-PCT
	U3O8	0.01	WT-PCT

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
3	V205	0.07	WT-PCT
	F	1.75	WT-PCT
	RARE EARTH	0.1	WT-PCT
4	P205	22.5	WT-PCT
	U308	0.01	WT-PCT
	V205	0.07	WT-PCT
	F	2.25	WT-PCT
	RARE EARTH	0.1	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: STRIPPING RATIO = 4.6 CUBIC YARDS OVERBURDEN TO 1 TON ORE.
RECORD 2: STRIPPING RATIO = 3.0 CUBIC YARDS OVERBURDEN TO 1 TON ORE.
RECORD 3: LOW GRADE RESOURCE.
RECORD 4: STRIPPING RATIO = 1.48 CUBIC YARDS OVERBURDEN TO 1 TON ORE; LOW PLUS MEDIUM PLUS HIGH GRADE ORE.

SOURCE FOR RECORD 1:
U. S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

SOURCE FOR RECORD 2, 3, AND 4:
GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U. S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST, U. S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820: GARRAND CORPORATION, 1975.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

----------EXPLORATION METHODS----------
SURFACE GEOLOGIC MAPPING/DRILLING/ TRENCHING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MINOR FOLDING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

CHERT	LIES OVER ORE
MUDSTONE	ENCLOSES ORE; GANGUE
SHALE	ENCLOSES ORE; GANGUE
PHOSPHORITE	IS ORE
LIMESTONE	ENCLOSES ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
CALCITE	CARBONATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

BIBLIOGRAPHY RECORDS

CARTER, R. A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING. V. 30, NO. 1, 1978, PP. 29-36.

CRESSMAN, E. R., AND R. A. GULBRANDSEN. GEOLOGY OF THE DRY VALLEY QUADRANGLE, IDAHO. U.S. GEOLOGICAL SURVEY BULL. 1015-I, 1955, PP. 257-270.

DAY, P. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET 155, 1973, 63 PP.

EMIGH, G. D. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1958, 60 PP.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820. GARRAND CORP., 1975.

LI, TA M. SOUTHEASTERN IDAHO PHOSPHATE MINING. HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-28.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, PP. 1046-1048.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 111, 1956, 48 PP.

MC KELVEY, V. E., D. F. DAVIDSON, F. W. O'MALLEY, AND L. E. SMITH, STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-48, PT. 1. U.S. GEOLOGICAL SURVEY CIRCULAR 208, 1953, PP. 14-24.

MC KELVEY, V. E., D. F. DAVIDSON, F. W. O'MALLEY, L. E. SMITH, F. C. ARMSTRONG, AND R. P. SHELDON. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-48, PT. 1. U.S. GEOLOGICAL SURVEY TRACE ELEMENTS INVESTIGATIONS REPORT 183, 1952, PP. 18-28.

MONTGOMERY, K. M., AND T. M. CHENEY. GEOLOGY OF THE STEWART FLAT QUADRANGLE CARIBOU COUNTY, IDAHO. U.S. GEOLOGICAL SURVEY BULL. 1217, 1967, 63 PP.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SERVICE, A. L., AND N. S. PETERSEN. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

SHELDON, R. P. M. A. WARNER, M. E. THOMPSON, AND H. W. PIERCE. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1949, PT. 1. U.S. GEOLOGICAL SURVEY CIRCULAR 304, 1953, PP. 9-13.

SHELDON, R. P. M. A. WARNER, M. E. THOMPSON, AND H. W. PIERCE. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1949, PT. 1. U. S. GEOLOGICAL SURVEY TRACE ELEMENTS INVESTIGATIONS REPORT 364, 1953, PP. 15-19.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-65.

THOMPSON, M. E. FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122.

U.S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: BLACKFOOT BRIDGE SITE
SEQUENCE NUMBER: 0160290167

NATION: USA STATE: IDAHO
COUNTY: CARIBOU
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 42 DEG 47 MIN 06 SEC
LONGITUDE: W 111 DEG 31 MIN 14 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4736856 EASTING: 457421
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 1981 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEDERAL LEASE; STATE LEASE
PATENTED CLAIM

OWNERSHIP	STATUS
U. S. GOVT. - BUREAU OF LAND MANAGEMENT	OWNER
STATE OF IDAHO	OWNER
MONSANTO CO.	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
VANADIUM	PHOSPHATIC SHALE	RECOVERABLE
FLUORINE		RECOVERABLE
RARE EARTH		RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3	RECORD 4
MEASURED	5,400,000	------	------	------
INDICATED	------	7,000,000	2,000,000	9,000,000
UNITS	MT ORE	MT ORE	MT ORE	MT ORE
YEAR/DATA	1978	1975	1975	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
2	P2O5	26.4	WT-PCT
	U3O8	0.01	WT-PCT
	V2O5	0.07	WT-PCT
	F	2.64	WT-PCT
	RARE EARTH	0.1	WT-PCT
3	P2O5	17.4	WT-PCT

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
3	U308	0.01	WT-PCT
	V205	0.07	WT-PCT
	F	1.74	WT-PCT
	RARE EARTH	0.1	WT-PCT
4	P205	24.6	WT-PCT
	U308	0.01	WT-PCT
	V205	0.07	WT-PCT
	F	2.46	WT-PCT
	RARE EARTH	0.1	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: STRIPPING RATIO = 3.0 CUBIC YARDS OVERBURDEN TO 1 TON ORE.
RECORD 2: STRIPPING RATIO = 2.8 CUBIC YARDS OVERBURDEN TC 1 TON ORE.
RECORD 3: LOW GRADE RESOURCE.
RECORD 4: STRIPPING RATIO = 2.1 CUBIC YARDS OVERBURDEN TO 1 TON ORE; LOW PLUS MEDIUM PLUS HIGH GRADE ORE.

SOURCE FOR RECORD 1:
U.S. GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIPONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

SOURCE FOR RECORD 2, 3, AND 4:
GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820. GARRAND CORP., 1975.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:	----------EXPLORATION METHODS----------
ORE-MINERAL IN PLACE	SURFACE GEOLOLOGICAL MAPPING/DRILLING/TRENCHING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MINOR FOLDING; FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: MESOZOIC
ROCK TYPE:

CHERT	LIES OVER ORE
MUDSTONE	ENCLOSES ORE; GANGUE
SHALE	ENCLOSES ORE; GANGUE
PHOSPHORITE	IS ORE
LIMESTONE	ENCLOSES ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
SERICITE	SILICATES	VARIABLE
KAOLINITE	SILICATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
CALCITE	CARBONATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE
LIMONITE	OXIDES (EXCLUDING SIO2)	VARIABLE
ORTHOCLASE	SILICATES	VARIABLE
CHALCEDONY	FORMS OF SIO2	VARIABLE
PYRITE	SULFIDES	VARIABLE

BIBLIOGRAPHY RECORDS

CARTER, R. A. AN INTEGRATED INDUSTRY - PHOSPHATE MINING AND MILLING IN IDAHO. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 29-36.

DAY, A. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET 155, 1973, 63 PP.

EMIG, G. L. PETROGRAPHY, MINERALOGY AND ORIGIN OF PHOSPHATE PELLETS IN THE PHOSPHORIA FORMATION. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 114, 1958, 60 PP.

GARRAND, L. J. PHOSPHATE STUDY SOUTHEASTERN IDAHO. FOR: U.S. DEPARTMENT OF AGRICULTURE, CARIBOU NATIONAL FOREST. U.S. DEPARTMENT OF AGRICULTURE CONTRACT NO. 50-820. GARRAND CORP., 1975.

LI, TA M. SOUTHEASTERN IDAHO PHOSPHATE MINING: HOW AN ENVIRONMENTAL IMPACT STATEMENT DISTORTS GROWTH PLANS. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 25-28.

MC DIVITT, J. F. ECONOMIC EVALUATION OF PHOSPHATE AND OTHER MINERALS IN SOUTHERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, PAMPHLET NO. 111, 1956, 48 PP.

MARTIN, G. W. MINERALOGY OF PHOSPHATE OOLITES. ECONOMIC GEOLOGY, V. 53, NO. 8, DECEMBER, 1958, PP. 1046-1048.

O'MALLEY, F. W., D. F. DAVIDSON, R. A. HOPPIN, AND R. P. SHELDON. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-48, PT. III. U. S. GEOLOGICAL SURVEY TRACE ELEMENTS INVESTIGATIONS REPORT 188, 1953, PP. 14-17.

O'MALLEY, F. W., D. F. DAVIDSON, R. A. HOPPIN, AND R. P. SHELDON. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN IDAHO. 1947-48, PT. III. U. S. GEOLOGICAL SURVEY CIRCULAR 262, 1953.

POWELL, J. D. EVALUATION OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. IDAHO BUREAU OF MINES AND GEOLOGY, INFORMATION CIRCULAR NO. 25, 1974, 33 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MINING ENGINEERING, V. 30, NO. 1, 1978, PP. 37-40.

SERVICE, A. L. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 3. IDAHO. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6801, 1966, 201 PP.

SERVICE, A. L., AND N. S. PETERSEN. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS) TRENDS AND OUTLOOK. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6935, 1967, 131 PP.

SERVICE, A. L. AND C. C. POPOFF. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES (IN FIVE PARTS), 1. INTRODUCTION REVIEW. U.S. BUREAU OF MINES, REPORT OF INVESTIGATIONS 6485, 1964, 86 PP.

THOMPSON, M. E. DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 988-D, 1953, PP. 45-65

THOMPSON, M.E . FURTHER STUDIES OF THE DISTRIBUTION OF URANIUM IN RICH PHOSPHATE BEDS OF THE PHOSPHORIA FORMATION. U.S. GEOLOGICAL SURVEY BULLETIN 1009-D, 1954, PP. 107-122.

U.S GEOLOGICAL SURVEY, BUREAU OF LAND MANAGEMENT, AND FOREST SERVICE. FINAL ENVIRONMENTAL IMPACT STATEMENT/DEVELOPMENT OF PHOSPHATE RESOURCES IN SOUTHEASTERN IDAHO. FOUR VOLUMES, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CENTENNIAL PHOSPHATE MINE SEQUENCE NUMBER: 0160330111

NATION: USA STATE: IDAHO COUNTY: CLARK
TYPE OF OPERATION: SURFACE CURRENT STATUS: PAST PRODUCER
LATITUDE: N 44 DEG 33 MIN 20 SEC LONGITUDE: W 111 DEG 41 MIN 27 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN NORTHING: 4933594 EASTING: 445131
POINT OF REFERENCE: ORE BODY PRECISION: 500 METERS
ELEVATION: 2652 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
  FEDERAL LEASE

ALTERNATE NAMES
  HUBY MINE
  TROUBLESOME RIDGE PHOSPHATE DEPOSIT

OWNERSHIP	STATUS
U. S. GOVERNMENT	OWNER
J.R.SIMPLOT, FERTILIZER DIVISION	OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
VANADIUM	PHOSPHATIC SHALE	RECOVERABLE
FLUORINE		RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT

DEPOSIT HISTORICAL INFORMATION

YEAR OF INITIAL PRODUCTION: 1956
YEAR OF FINAL PRODUCTION: 1958

----------EXPLORATION METHODS----------
SURFACE GEOLOGICAL MAPPING/CORE DRILLING/ TRENCHING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MINOR FOLDING; FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: CRETACEOUS
ROCK TYPE:
PHOSPHORITE IS ORE
SANDSTONE
LIMESTONE
CHERT
QUARTZITE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC

BIBLIOGRAPHY RECORDS

HONKALA, F.S. PRELIMINARY REPORT ON GEOLOGY OF CENTENNIAL RANGE, MONTANA-IDAHO. PHOPHATE DEPOSITS. U.S. GEOL.SURVEY OPEN FILE REPORT, 1953.

JEMMETT. MS THESIS, UNIV. OF IDAHO. MOSCOW, IDAHO. 1955, 67 PP.

STOUT, K. DIRECTORY OF KNOWN MINING ENTERPRISES 1957. MONTANA BUREAU OF MINES AND GEOLOGY IC 20, 1958.

MONTANA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: RELYEA MINE

SEQUENCE NUMBER: 0300770001

NATION: USA STATE: MONTANA
TYPE OF OPERATION: UNDERGROUND
LATITUDE: N 46 DEG 37 MIN 44 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
POINT OF REFERENCE: MAIN ENTRANCE
ELEVATION: 2073 METERS
DATUM: SEA LEVEL

COUNTY: POWELL
CURRENT STATUS: PAST PRODUCER
LONGITUDE: W 112 DEG 48 MIN 15 SEC
NORTHING: 5165286 EASTING: 361887
PRECISION: 10 METERS
PRECISION: 500 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
GEORGE A. RELYEA, GARRISON, MONTANA	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
VANADIUM	PHOSPHATIC SHALE	RECOVERABLE
FLUORINE	FLUORSPAR	RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	300,000
INDICATED	400,000
INFERRED	100,000
UNITS	MT ORE
YEAR/DATA	1981

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	32	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCES FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. INTERNATIONAL DIRECTORY OF MINING. 1981, PP. 204.

POROFF, C. C. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES, PART 2, MONTANA. U.S.B.M. RI 6611, 1965.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
PRE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1946
YEAR OF INITIAL PRODUCTION: 1947
YEAR OF FINAL PRODUCTION: 1976

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; FAULTING
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MINOR FOLDING; FAULTING
ROCK TYPE:

PHOSPHORITE	IS ORE
SANDSTONE	LIES OVER ORE; LIES UNDER ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE
CHERT	LIES OVER ORE; LIES UNDER ORE
QUARTZITE	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
QUARTZ	FORMS OF SIO2
CALCITE	CARBONATES
MONTMORILLONITE	SILICATES

BIBLIOGRAPHY RECORDS

ENGINEERING AND MINING JOURNAL. INTERNATIONAL MINING DIRECTORY. 1981. PP. 206.

ENGINEERING AND MINING JOURNAL. INTERNATIONAL MINING DIRECTORY. 1975. PP. 155.

MONTANA BUREAU OF MINES AND GEOLOGY. BULL. 95, 1975, PP. 36.

POPOFF, C. C. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES, PART 2, MONTANA. U.S.B.M. RI 6611, 1965.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: WARM SPRINGS CREEK PHOSPHATE MINE
NATION: USA STATE: MONTANA
TYPE OF OPERATION: UNDERGROUND
LATITUDE: N 46 DEG 36 MIN 23 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
POINT OF REFERENCE: MAIN ENTRANCE
ELEVATION: 1475 METERS
DATUM: SEA LEVEL

SEQUENCE NUMBER: 0300770214

COUNTY: POWELL
CURRENT STATUS: PRODUCER
LONGITUDE: W 112 DEG 46 MIN 48 SEC
NORTHING: 5162745 EASTING: 363680
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
PATENTED CLAIM; FEDERAL LEASE

ALTERNATE NAMES
BISHOP ADIT
SPOKANE CHEMICAL CO. WORKINGS
ANDERSON MINE
BROCK MINE

OWNERSHIP
COMINCO, SPOKANE
US GOVERNMENT

STATUS
OWNER-OPERATOR
OWNER

COMMODITY
PHOSPHATE
FLUORINE
URANIUM
VANADIUM

MARKETABILITY
PRIMARY PRODUCT
RECOVERABLE
RECOVERABLE
RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED JANUARY 1981 RESERVE TONNAGE FOR IDAHO AND MONTANA IS 352 MILLION METRIC TONS OF ORE AT AN IN SITU GRADE OF 25.6% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, DEMONSTRATED RESERVES OF THIS DEPOSIT.

SOURCE: PANTEL, P. J., D. E. SULLIVAN, AND G. R. PETERSON. PHOSPHATE ROCK AVAILABILITY - DOMESTIC, A MINERALS AVAILABILITY PROGRAM APPRAISAL. BUMINES I. C. (IN PRESS).

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1912
YEAR OF INITIAL PRODUCTION: 1929

----------EXPLORATION METHODS----------
SURFACE GEOLOGICAL MAPPING/
SUBSURFACE GEOLOGICAL MAPPING/CORE DRILLING/
TEST ADIT/TEST DRIFT/CROSSCUT/TEST PIT/
TRENCHING/BEDROCK SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: PERMIAN
DEFORMATION DESCRIPTION: MINOR FOLDING; FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: OLDER THAN CRETACEOUS
ROCK TYPE:
CHERT
LIES OVER ORE; LIES UNDER ORE

SANDSTONE	LIES OVER ORE; LIES UNDER ORE
QUARTZITE	LIES OVER ORE
PHOSPHORITE	IS ORE
CONGLOMERATE	LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	PHANERITIC-FINE
QUARTZ	FORMS OF SIO2	PHANERITIC-FINE

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: ROOM AND PILLAR
CHARACTERISTIC OF ROCK: MULTIPLE SYSTEMS OF WEAKNESS PLANES
ROCK AND WATER CONDITIONS: HARDROCK WITH LITTLE WATER
ROCK/MINE SUPPORT: SUPPORTING MAY BACK SLAB; TIMBER
CONDITION OF WORKINGS: OPEN

BENEFICIATION:
METHOD: SIZING ----------DESCRIPTION OF MILLING----------
ORE FROM CRUSHER IS SCREENED/-.95 CM TO ORE BIN/
+.95-CRUSHER

PRODUCT	ASSAY FORM
P205 ROCK	P205

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORGINIATING FACILITY: MILL (ON-SITE)
LOCATION: USA MONTANA
LATITUDE: N 46 36 23 LONGITUDE: W 112 46 48
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK; RAIL
DESTINATION FACILITY: REFINERY LOCATION: CANADA
LATITUDE: N 49 40 00 LONGITUDE: W 116 00 00

BIBLIOGRAPHY RECORDS

ANDERSON, W. TEST OPERATION OF A PNEUMATIC VIBRATING-BLADE PLANER IN PHOSPHATE AND COAL. USBM RI 6140, 1962, 21 PP.

ARMSTRONG, R. J. MINING OERATIONS OF THE MONTANA PHOSPHATE PRODUCTS COMPANY. MINING TRANSACTIONS AIME, VOL. 184, PP. 287-291.

CANADIAN MINING JOURNAL. CHAPTER 13. MAY 1954, PP. 195-201.

EMIGH, G. D. PETROLOGY AND ORIGIN OF PHOSPHORITES, ANATOMY OF THE WESTERN PHOSPHATE FIELD. 15TH ANNUAL FIELD CONFERENCE, INTERMOUNTAIN ASSOCIATION GEOLOGISTS, 1967.

ENGINEERING AND MINING JOURNAL. SEPTEMBER 1973, PP. 142-147.

GILBERT, G. MINING OPERATIONS OF THE MONTANA PHOSPHATE PRODUCTS COMPANY. TRANS. AIME 173, 1947, PP. 240-244.

HOWARD, T. E. DESIGN AND DEVELOPMENT OF A PNEUMATIC VIBRATING-BLADE PLANER FOR MINING PHOSPHATE ROCK. USBM RI 5210, 1956, 30 PP. LOWRISON, G. CRUSHING AND GRINDING. C R C PRESS, INC., 1974, PP. 193-206.

LUFT, S. PHOSPHATE REPORT. NORTHERN PACIFIC RAILWAY COMPANY PROPERTIES AND INDUSTRIAL DEVELOPMENT DEPT., 1958, PP. 106.

MINING WORLD. HOW MONTANA PHOSPHATE CUTS COSTS. FEB. 1956, PP. 52-56.

MINING WORLD. MONTANA PHOSPHATE STARTS OPEN-PIT TO MINE THIN ORE BED ON 24 DEG SLOPE. NOV. 1955, PP. 44-46.

PARDEE, J. T. SOME FURTHER DISCOVERIES OF ROCK PHOSPHATE IN MONTANA. USGS BULL. 530, 1913, PP. 285-291.

PARDEE, J. T. THE GARRISON AND PHILIPSBURG PHOSPHATE FIELDS. MONT. USGS BULL. 640, 1916, PP. 195-228.

PUPUFF, C. C. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES, PART 2, MONTANA. USBM RI 6611, 1965, PP. 145 PP.

SERVICE, A. L. M. DESIGN AND TEST OPERATION OF A PNEUMATIC VIBRATING-BLADE PLANER. USBM RI 5437, 1959, 22 PP.

NORTH_CAROLINA

LOCATION_AND_GENERAL_DEPOSIT_INFORMATION

DEPOSIT NAME: NORTH CAROLINA PHOSPHATE CORP. SEQUENCE NUMBER: 0370130001

NATION: USA STATE: NORTH CAROLINA COUNTY: BEAUFORT
TYPE OF OPERATION: SURFACE CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: N 35 DEG 20 MIN 00 SEC LONGITUDE: W 76 DEG 46 MIN 17 SEC
UTM - ZONE: 18 HEMISPHERE: NORTHERN NORTHING: 3911250 EASTING: 339003
POINT OF REFERENCE: ORE BODY PRECISION: 1 KILOMETER
ELEVATION: 3 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
NORTH CAROLINA PHOSPHATE CORPORATION	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED_RESERVE-RESOURCE_INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA IS 20.971 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.79% OF P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 14-79, 1978, 65 PP.

DEPOSIT_HISTORICAL_INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1951

--------EXPLORATION METHODS-------
CORE DRILLING/RADIOACTIVITY SURVEY

GEOLOGIC_AND_SPATIAL_CHARACTERISTICS_OF_DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: PUNGO RIVER FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
LIMESTONE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
FRANCOLITE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

BROWN, P.M. THE RELATION OF PHOSPHATES TO GROUND WATER IN BEAUFORT COUNTY, NORTH CAROLINA. ECON. GEOL., V. 53, 1958, PP. 85-101.

CALDWELL, A.B. LEE CREEK OPEN-PIT MINE AND FERTILIZER PLANTS. ENG. AND MIN. J., JANUARY 1968, PP. 59-82.

HIRD, J.M. CONTROL OF ARTESIAN GROUND WATER IN STRIP MINING PHOSPHATE ORES - EASTERN NORTH CAROLINA. PRESENTATION AT AIME ANNUAL CONF., DENVER, COLO., FEBRUARY 1970, 11 PP.

HIRD, J.M. OVERBURDEN STRIPPING - COMBINATION USE OF DREDGE AND DRAGLINE. MIN. ENG., MARCH 1980, PP. 311-314.

KIMERY, J.O. DESCRIPTION OF THE PUNGO RIVER FORMATION IN BEAUFORT COUNTY, NORTH CAROLINA. NORTH CAROLINA DEPT. OF CONSERVATION AND DEVELOPMENT BULL. 79, 1968, 131 PP.

PIT AND QUARRY. TEXASGULF SULPHUR CO. JANUARY 1969, PP. 125-138.

ROONEY, T.P. AND P.F. KERR. MINERALOGIC NATURE AND ORIGIN OF PHOSPHORITE, BEAUFORT COUNTY, NORTH CAROLINA. GEOL. SOC. AM. BULL., V. 78, JUNE 1967, PP. 731-748.

STUCKEY, J.L. NORTH CAROLINA: ITS GEOLOGY AND MINERAL RESOURCES. NORTH CAROLINA DEPARTMENT OF CONSERVATION AND DEVELOPMENT, RALEIGH, 1965, 550 PP.

TEXASGULF INC. 1979 10-K REPORT. PP. 1-3.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 14-79, 1978, 65 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: PUNGO RIVER DEPOSIT
SEQUENCE NUMBER: 0370130008

NATION: USA STATE: NORTH CAROLINA
COUNTY: BEAUFORT
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 35 DEG 28 MIN 48 SEC
LONGITUDE: W 76 DEG 30 MIN 50 SEC
UTM - ZONE: 18 HEMISPHERE: NORTHERN
NORTHING: 3927129 EASTING: 362659
POINT OF REFERENCE: ORE BODY
PRECISION: 500 METERS
ELEVATION: 2 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; STATE LEASE

OWNERSHIP	STATUS
FMC INC.	OWNER
STATE OF NORTH CAROLINA	OWNER
NUMEROUS SMALL OWNERS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA IS 20.971 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.79% OF P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 14-79, 1978, 65 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1950

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; REPLACEMENT; DISSEMINATED
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY; CONTACT ZONE
DEGREE OF WALL ROCK ALTERATION: MODERATE

LITHOLOGY:
NAME OF FORMATION: PUNGO RIVER FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ZELLARS-WILLIAMS INC., EVALUATION OF THE PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM, BUMINES OPEN FILE REPORT 14-79.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: LEE CREEK MINE

SEQUENCE NUMBER: 0370130009

NATION: USA STATE: NORTH CAROLINA
TYPE OF OPERATION: SURFACE
LATITUDE: N 35 DEG 23 MIN 03 SEC
UTM - ZONE: 18 HEMISPHERE: NORTHERN
POINT OF REFERENCE: PLANT
ELEVATION: 3 METERS
DATUM: SEA LEVEL

COUNTY: BEAUFORT
CURRENT STATUS: PRODUCER
LONGITUDE: W 76 DEG 47 MIN 37 SEC
NORTHING: 3916925 EASTING: 337086
PRECISION: 100 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
TEXASGULF CHEMICALS COMPANY

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U308 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA IS 20.971 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.79% OF P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 14-79, 1978, 65 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1951
YEAR OF INITIAL PRODUCTION: 1966

-------EXPLORATION METHODS--------
CORE DRILLING/RADIOACTIVITY SURVEY

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED; REPLACEMENT
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: MASSIVE; IRREGULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

LITHOLOGY:
NAME OF FORMATION: PUNGO RIVER FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
LIMESTONE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
FRANCOLITE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
60 PERCENT SAND, SILT
40 PERCENT QUICKSAND
HARDNESS OF ORE:
QUICKSAND
PERCENT WASTE ROCK: 71.4
BENCH HEIGHT: 18 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LOCATION: USA NORTH CAROLINA
LATITUDE: N 35 23 03
LONGITUDE: W 76 47 37
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE
DISTANCE (KM): 3.2
DESTINATION FACILITY: MILL (ON-SITE)
LOCATION: USA NORTH CAROLINA
LATITUDE: N 35 23 03
LONGITUDE: W 76 47 37

BENEFICIATION:
METHOD: FLOTATION

-----DESCRIPTION OF MILLING------
ORE/SLURRY/SCREEN/WASH/FEED TO FLOTATION/PRODUCT TO STORAGE/CLAY TO DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USA NORTH CAROLINA
LATITUDE: N 35 23 03 LONGITUDE: W 76 47 37
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: CONVEYOR DISTANCE (KM): 0.32
DESTINATION FACILITY: REFINERY (ON-SITE) LOCATION: USA NORTH CAROLINA
LATITUDE: N 35 23 03 LONGITUDE: W 76 47 37

BIBLIOGRAPHY RECORDS

BROWN, P.M. THE RELATION OF PHOSPHATES TO GROUND WATER IN BEAUFORT COUNTY, NORTH CAROLINA. ECON. GEOL., V. 53, 1958, PP. 85-101.

CALDWELL, A.B. LEE CREEK OPEN-PIT MINE AND FERTILIZER PLANTS. ENG. AND MIN. J., JANUARY 1968, PP. 59-82.

HIRD, J.M. CONTROL OF ARTESIAN GROUND WATER IN STRIP MINING PHOSPHATE ORES - EASTERN NORTH CAROLINA. PRESENTATION AT AIME ANNUAL CONF., DENVER, COLO., FEBRUARY 1970, 11 PP.

HIRD, J.M. OVERBURDEN STRIPPING - COMBINATION USE OF DREDGE AND DRAGLINE. MIN. ENG., MARCH 1980, PP. 311-314.

KIMERY, J.O. DESCRIPTION OF THE PUNGO RIVER FORMATION IN BEAUFORT COUNTY, NORTH CAROLINA. NORTH CAROLINA DEPT. OF CONSERVATION AND DEVELOPMENT BULL. 79, 1968, 131 PP.

PIT AND QUARRY. TEXASGULF SULPHUR CO. JANUARY 1969, PP. 125-138.

ROONEY, T.P. AND P.F. KERR. MINERALOGIC NATURE AND ORIGIN OF PHOSPHORITE, BEAUFORT COUNTY, NORTH CAROLINA. GEOL. SOC. AM. BULL., V. 78, JUNE 1967, PP. 731-748.

STUCKEY, J.L. NORTH CAROLINA: ITS GEOLOGY AND MINERAL RESOURCES. NORTH CAROLINA DEPARTMENT OF CONSERVATION AND DEVELOPMENT, RALEIGH, 1965, 550 PP.

TEXASGULF INC. 1979 10-K REPORT. PP. 1-3.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 14-79, 1978, 65 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: PAMLICO RIVER DEPOSIT
SEQUENCE NUMBER: 0370130017

NATION: USA STATE: NORTH CAROLINA
COUNTY: BEAUFORT
TYPE OF OPERATION: MINERAL LOCATION
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 35 DEG 24 MIN 15 SEC
LONGITUDE: W 76 DEG 47 MIN 30 SEC
UTM - ZONE: 18 HEMISPHERE: NORTHERN
NORTHING: 3919140 EASTING: 337302
POINT OF REFERENCE: ORE BODY
PRECISION: 500 METERS
ELEVATION: 3 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; STATE LEASE

OWNERSHIP	STATUS
STATE OF NORTH CAROLINA	OWNER
TEXASGULF INCORPORATED	OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA IS 20.971 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.79% OF P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 14-79, 1978, 65 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE
YEAR OF DISCOVERY: 1950

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; REPLACEMENT; DISSEMINATED
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY; CONTACT ZONE

LITHOLOGY:
NAME OF FORMATION: PUNGO RIVER FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

TEXASGULF INC. 1979 10-K REPORT. PP. 1-3.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 14-79, 65 PP.

SOUTH CAROLINA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: COOSAWHATCHEE REGION DEPOSITS SEQUENCE NUMBER: 0450130001

NATION: USA STATE: SOUTH CAROLINA COUNTY: BEAUFORT
TYPE OF OPERATION: SURFACE CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 32 DEG 32 MIN 38 SEC LONGITUDE: W 80 DEG 46 MIN 23 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3600556 EASTING: 521309
POINT OF REFERENCE: ORE BODY PRECISION: 500 METERS
ELEVATION: 15 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
  FEE OWNERSHIP

OWNERSHIP	STATUS
STATE OF SOUTH CAROLINA	OWNER
PRIVATE CORPORATIONS AND OWNERS	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA IS 20.971 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.79% OF P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 14-79, 1978, 65 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1963

-------EXPLORATION METHODS-------
AUGER/CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; REPLACEMENT; DISSEMINATED
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: IRREGULAR; MASSIVE
CONTROLLING FEATURES: LITHOLOGY; CONTACT ZONE

LITHOLOGY:
NAME OF FORMATION: HAWTHORN FORMATION GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

COLQUHONN, D.J. GEOMORPHOLOGY OF THE LOWER COASTAL PLAIN OF SOUTH CAROLINA. DIVISION OF GEOLOGY, STATE DEVELOPMENT BOARD, COLUMBIA, SOUTH CAROLINA, 1969.

HUNTER, C.E., J.A. BARR, JR., AND F. CHAPPELL. REPORT OF INVESTIGATION OF SOUTH CAROLINA PHOSPHATE DEPOSIT, 1966, 60 PP.

JOHNSON, H.S., JR., AND G.R. VERNON, JR. PHOSPHATE AND BENTONITE RESOURCES, COOSAWATCHIE DISTRICT. SOUTH CAROLINA DIVISION OF GEOLOGY, SOUTH CAROLINA STATE DEVELOPMENT BOARD, 1965.

LITTLE, A.D. INC. EVALUATION OF SOUTH CAROLINA PHOSPHATE DEPOSIT. REPORT TO PINE HALL POMONA CORP., 1966.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 14-79, 1978, 65 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CHARLESTON REGION DEPOSITS SEQUENCE NUMBER: 0450190010

NATION: USA STATE: SOUTH CAROLINA COUNTY: CHARLESTON
TYPE OF OPERATION: SURFACE CURRENT STATUS: PAST PRODUCER
LATITUDE: N 32 DEG 46 MIN 30 SEC LONGITUDE: W 80 DEG 56 MIN 28 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN NORTHING: 3626155 EASTING: 505515
POINT OF REFERENCE: ORE BODY PRECISION: 500 METERS
ELEVATION: 10 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
  FEE OWNERSHIP

OWNERSHIP	STATUS
STATE OF SOUTH CAROLINA	OWNER
PRIVATE OWNERS UNDETERMINED	UNKNOWN

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
FLUORINE		RECOVERABLE
URANIUM	U3O8 CONTENT	RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
MAGNESIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA IS 20.971 BILLION METRIC TONS OF ORE AT AN EXTRACTABLE GRADE OF 8.79% OF P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 14-79, 1978, 65 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1867
YEAR OF INITIAL PRODUCTION: 1867
YEAR OF FINAL PRODUCTION: 1938

-------EXPLORATION METHODS-------
SURFACE GEOLOGICAL MAPPING/AUGER/
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; REPLACEMENT; DISSEMINATED
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY; CONTACT ZONE
DEGREE OF WALL ROCK ALTERATION: MODERATE

LITHOLOGY:
NAME OF FORMATION: COOPER FORMATION GEOLOGIC AGE: OLIGOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	GANGUE
SILT	GANGUE
CLAY	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
QUARTZ	FORMS OF SIO2	VARIABLE
COLLOPHANE	PHOSPHATES	VARIABLE
MONTMORILLONITE	SILICATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

BIBLIOGRAPHY RECORDS

ALTSCHULER, Z.S., R.S. CLARKE, JR., AND E.S. YOUNG. GEOCHEMISTRY OF URANIUM IN APATITE AND PHOSPHORITE. U.S. GEOL. SURVEY PROFESSIONAL PAPER 314, 1958, PP. 45-87.

FORCE, E.R., G.S. GOHN, L.M. FORCE, AND B.B. HIGGINS. URANIUM AND PHOSPHATE RESOURCES IN THE COOPER FORMATION OF CHARLESTON REGION, SOUTH CAROLINA, U.S. GEOL. SURVEY PRELIMINARY REPORT, 1978, 22 PP.

MALDE, H.E. GEOLOGY OF THE CHARLESTON PHOSPHATE AREA, SOUTH CAROLINA. U.S. GEOLOGICAL SURVEY BULLETIN 1079, 1959, 105 PP.

ROGERS, S.G. THE POSPHATE DEPOSITS OF SOUTH CAROLINA. U.S. GEOLOGICAL SURVEY BULLETIN 580, 1914, PP. 183-220.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF GEORGIA, NORTH CAROLINA, AND SOUTH CAROLINA USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 14-79, 1978, 65 PP.

TENNESSEE

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HOOKER CHEMICAL PROPERTIES SEQUENCE NUMBER: 0471190081

NATION: USA STATE: TENNESSEE COUNTY: MAURY
TYPE OF OPERATION: SURFACE CURRENT STATUS: PRODUCER
LATITUDE: N 35 DEG 39 MIN 31 SEC LONGITUDE: W 87 DEG 02 MIN 36 SEC
UTM - ZONE: 16 HEMISPHERE: NORTHERN NORTHING: 3945885 EASTING: 496077
POINT OF REFERENCE: PLANT PRECISION: 500 METERS
ELEVATION: 262 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; PRIVATE LEASE

OWNERSHIP		STATUS
HOOKER CHEMICAL		OWNER-OPERATOR
COMMODITY	**MODIFIER**	**MARKETABILITY**
PHOSPHATE	PHOSPHORUS	PRIMARY PRODUCT
FLUORINE		RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
CALCIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	AFFECT MARKETABLITY

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR TENNESSEE IS 71.672 MILLION METRIC TONS OF ORE AT AN IN SITU GRADE OF 20.9% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF TENNESSEE USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 13 - 79, 1978, 37 PP..

DEPOSIT CONSISTS OF 70 SMALL DEPOSITS IN GILES, HICKMAN, MAURY, AND WILLIAMSON COUNTIES.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1893
YEAR OF INITIAL PRODUCTION: 1941

-------EXPLORATION METHODS-------
AUGER

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; REPLACEMENT; DISSEMINATED
MODE OF ORIGIN: RESIDUAL CONCENTRATION; SEDIMENTATION
SHAPE OF ORE BODY: IRREGULAR; TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

LITHOLOGY:
NAME OF FORMATION: BIGBY-CANNON LIMESTONE GEOLOGIC AGE: MIDDLE ORDOVICIAN
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES UNDER ORE
SAND	GANGUE
CLAY	GANGUE
CHERT	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
CALCITE	CARBONATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION
ORE FEED TO WASHER-GODWIN

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
100 PERCENT SAND, SILT
PERCENT WASTE ROCK: 66.6
HARDNESS OF ORE:
SAND, SILT
SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: USA TENNESSEE
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 19 (AVERAGE)
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: WASHER-GODWIN, TENNESSEE
LATITUDE: N 35 39 31 LONGITUDE: W 87 02 36

BENEFICIATION:
METHOD: WASHING
--------DESCRIPTION OF MILLING-------
ORE/SLUICE/SCREEN/CRUSH/WASH/CLASSIFY/
CLAY TO DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE CONCENTRATE
ORGINATING FACILITY: MILL (OFF-SITE) LOCATION: WASHER-GODWIN, TENNESSEE
LATITUDE: N 35 39 31 LONGITUDE: W 87 02 36
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 0
DESTINATION FACILITY: SMELTER(ON-SITE) LOCATION: FURNACE-GODWIN, TENNESSEE
LATITUDE: N 35 39 31 LONGITUDE: W 87 02 36

MINE/MILL INFORMATION
ORE FEED TO WASHER-WILLIAMSPORT

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
SAND, SILT 100 PERCENT
PERCENT WASTE ROCK: 66.6
HARDNESS OF ORE:
SAND, SILT
SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LOCATION: USA TENNESSEE
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK
DISTANCE (KM): 19 (AVERAGE)
DESTINATION FACILITY: MILL (OFF-SITE)
LOCATION: WILLIAMSPORT, TENNESSEE
LATITUDE: N 35 41 25
LONGITUDE: W 85 12 55

BENEFICIATION:
METHOD: WASHING
-------DESCRIPTION OF MILLING--------
ORE/SLUICE/SCREEN/CRUSH/WASH/CLASSIFY/
CLAY TO DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE CONCENTRATE
ORIGINATING FACILITY: MILL (OFF-SITE)
LOCATION: WASHER-WILLIAMSPORT
LATITUDE: N 35 41 25
LONGITUDE: W 85 12 55
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK
DISTANCE (KM): 24 (AVERAGE)
DESTINATION FACILITY: SMELTER
LOCATION: FURNACE-GODWIN, TENN.
LATITUDE: N 35 39 31
LONGITUDE: W 87 02 36

BIBLIOGRAPHY RECORDS

BATES, R. L. TENNESSEE PHOSPHATE DEPOSITS. GEOLOGY OF INDUSTRIAL ROCKS AND MINERALS, DOVER, N.Y. 1969, PP. 187-190.

HERSHEY, F. E., R. J. FLOYD, F. A. MILLER, C. W. WILSON, ET AL. GEOLOGIC MAPS AND MINERAL RESOURCE SUMMARIES. TENN. DIVISION OF GEOLOGY, 1963-1970.

SMITH, P. W. AND C. I. WHITLATCH. THE PHOSPHATE RESOURCES OF TENNESSEE. TENN. DIV. OF GEOL. BULL. 48, 1940, 444 PP.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF TENNESSEE USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 13-79, 197-, 37 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: TENNESSEE VALLEY AUTHORITY RESERVES
SEQUENCE NUMBER: 0471190082
NATION: USA STATE: TENNESSEE
COUNTY: MAURY
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PAST PRODUCER
LATITUDE: N 35 DEG 22 MIN 12 SEC
LONGITUDE: W 87 DEG 34 MIN 48 SEC
UTM - ZONE: 16 HEMISPHERE: NORTHERN
NORTHING: 3914031 EASTING: 447311
POINT OF REFERENCE: PLANT
ELEVATION: 260 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; MINERALS ONLY

OWNERSHIP
TENNESSEE VALLEY AUTHORITY

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE	PHOSPHORUS	PRIMARY PRODUCT
FLUORINE		RECOVERABLE
IRON	FERRIC OXIDE	RECOVERABLE
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
CALCIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR TENNESSEE IS 71.672 MILLION METRIC TONS OF ORE AT AN IN SITU GRADE OF 20.9% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF TENNESSEE USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 13 - 79, 1978, 37 PP..

DEPOSITS CONSISTS OF 37 SMALL DEPOSITS IN GILES AND WILLIAMSON COUNTIES.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1893
YEAR OF INITIAL PRODUCTION: 1942
YEAR OF FINAL PRODUCTION: 1977

------EXPLORATION METHODS-------
AUGER

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; REPLACEMENT; DISSEMINATED
MODE OF ORIGIN: RESIDUAL CONCENTRATION; SEDIMENTATION
SHAPE OF ORE BODY: IRREGULAR; TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

LITHOLOGY:
NAME OF FORMATION: BIGBY-CANNON LIMESTONE GEOLOGIC AGE: MIDDLE ORDOVICIAN
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES UNDER ORE
SAND	GANGUE
CLAY	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE

BIBLIOGRAPHY RECORDS

BATES, R. L. TENNESSEE PHOSPHATE DEPOSITS. GEOLOGY OF INDUSTRIAL ROCKS AND MINERALS, NEW YORK, 1969, PP. 187-90.

BROWN, L. P. THE PHOSPHATE DEPOSITS OF THE SOUTHERN STATES. ENGINEERING ASSOC. OF THE SOUTH, VOL. 15, NO. 8, 1904, PP. 85-118.

HERSHEY, P. E., R. J. FLOYD, R. A. MILLER, C. W. WILSON, ET AL. GEOLOGIC MAPS AND MINERAL RESOURCE SUMMARIES. TENNESSEE DIVISION OF GEOLOGY, 1963-1970.

SMITH, R. W., AND G. I. WHITLATCH. THE PHOSPHATE RESURCES OF TENNESSEE. TENN. DIVISION OF GEOLOGY BULL. 38, 1940, 444 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MOBIL CHEMICAL COMPANY
SEQUENCE NUMBER: 0471190083

NATION: USA STATE: TENNESSEE
COUNTY: MAURY
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PAST PRODUCER
LATITUDE: N 35 DEG 16 MIN 48 SEC
LONGITUDE: W 87 DEG 05 MIN 24 SEC
UTM - ZONE: 16 HEMISPHERE: NORTHERN
NORTHING: 3903900 EASTING: 491815
POINT OF REFERENCE: PLANT
PRECISION: 10 KILOMETERS
ELEVATION: 215 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; MINERALS ONLY

OWNERSHIP
MOBIL CHEMICAL COMPANY

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE	PHOSPHORUS	PRIMARY PRODUCT
FLUORINE		RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
CALCIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR TENNESSEE IS 71.672 MILLION METRIC TONS OF ORE AT AN IN SITU GRADE OF 20.9% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF TENNESSEE USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 13 - 79, 1978, 37 PP..

DEPOSIT CONSISTS OF 29 SMALL DEPOSITS IN GILES AND MAURY COUNTIES.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1896
YEAR OF INITIAL PRODUCTION: 1898
YEAR OF FINAL PRODUCTION: 1970

-------EXPLORATION METHODS-------
AUGER

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; REPLACEMENT; DISSEMINATED
MODE OF ORIGIN: RESIDUAL CONCENTRATION; SEDIMENTATION
SHAPE OF ORE BODY: IRREGULAR; TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

LITHOLOGY:
NAME OF FORMATION: BIGBY-CANNON LIMESTONE GEOLOGIC AGE: MIDDLE ORDOVICIAN
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES UNDER ORE
SAND	GANGUE
CLAY	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE

BIBLIOGRAPHY RECORDS

BATES, R. L. TENNESSEE PHOSPHATE DEPOSITS. GEOLOGY OF INDUSTRIAL ROCKS AND MINERALS, DOVER, N.Y., 1969, PP. 187-190.

HERSHEY, H. E., R. J. FLOYD, R. A. MILLER, C. W. WILSON, ET AL. GEOLOGIC MAPS AND MINERAL RESOURCE SUMMARIES. TENNESSEE DIV. OF GEOLOGY, 1963-1970.

SMITH, R. W. AND G. I. WHITLATCH. THE PHOSPHATE RESOURCES OF TENNESSEE. TENN. DIV. OF GEOL. BULL. 48, 1940, 444 PP.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF TENNESSEE USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 13-79, 1978, 37 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: STAUFFER CHEMICAL CO. PROPERTIES
SEQUENCE NUMBER: 0471190084

NATION: USA STATE: TENNESSEE
COUNTY: MAURY
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 35 DEG 32 MIN 15 SEC
LONGITUDE: W 87 DEG 10 MIN 00 SEC
UTM - ZONE: 16 HEMISPHERE: NORTHERN
NORTHING: 3932466 EASTING: 484891
POINT OF REFERENCE: PLANT
PRECISION: 10 KILOMETERS
ELEVATION: 200 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; MINERALS ONLY;
PRIVATE LEASE

ALTERNATE NAMES
GLOBE MINE

OWNERSHIP	STATUS
STAUFFER CHEMICAL COMPANY	OWNER
PRESSNELL PHOSPHATE COMPANY	OPERATOR
OTHERS (UNKNOWN)	OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE	PHOSPHORUS	PRIMARY PRODUCT
FLUORINE		RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
CALCIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR TENNESSEE IS 71.672 MILLION METRIC TONS OF ORE AT AN IN SITU GRADE OF 20.9% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF TENNESSEE USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 13 - 79, 1978, 37 PP..

DEPOSIT CONSISTS OF 78 SMALL DEPOSITS IN GILES, MAURY, AND WILLIAMSON COUNTIES.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  CRE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1893
YEAR OF INITIAL PRODUCTION: 1936

-------EXPLORATION METHODS-------
AUGER

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; REPLACEMENT; DISSEMINATED
MODE OF ORIGIN: RESIDUAL CONCENTRATION; SEDIMENTATION
SHAPE OF ORE BODY: IRREGULAR; TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

LITHOLOGY:
  NAME OF FORMATION: BIGBY-CANNON LIMESTONE GEOLOGIC AGE: MIDDLE ORDOVICIAN
  ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES UNDER ORE
SAND	GANGUE
CLAY	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE

MINE/MILL INFORMATION
ORE FEED TO STAUFFER PLANT

SURFACE MINING:
  METHOD: STRIPPING
  DESCRIPTION OF COVER:
    100 PERCENT QUICKSAND
  PERCENT WASTE ROCK: 83.0

HARDNESS OF ORE:
  QUICKSAND

TRANSPORTATION (ORE):
  ORIGINATING FACILITY: MINE
  LATITUDE: N 35 32 06
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: TRUCK
  DESTINATION FACILITY: MILL (OFF-SITE)
  LATITUDE: N 35 32 15

LOCATION: USA TENNESSEE
LONGITUDE: W 87 01 48

DISTANCE (KM): 31
LOCATION: WASHER-MT. PLEASANT, TENN.
LONGITUDE: W 87 10 00

BENEFICIATION:
  METHOD: WASHING

-------DESCRIPTION OF MILLING------
ORE/CRUSHED/SCREENED/WASHED/FINES TO CYCLONES/TAILINGS TO PONDS/SAND PRODUCT/TAILINGS TO PONDS/SAND PRODUCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE CONCENTRATE
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: WASHER-MT. PLEASANT, TENN.
LATITUDE: N 35 32 15 LONGITUDE: W 87 10 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 5
DESTINATION FACILITY: SMELTER LOCATION: FURNACE-MT. PLEASANT, TENN.
LATITUDE: N 35 33 00 LONGITUDE: W 87 13 00

MINE/MILL INFORMATION
ORE FEED TO CONTRACTED PLANT

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER: HARDNESS OF ORE:
QUICKSAND 100 PERCENT QUICKSAND
PERCENT WASTE ROCK: 83.0

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: USA TENNESSEE
LATITUDE: N 35 40 00 LONGITUDE: W 87 05 00
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 14
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: WASHER-COLUMBIA, TENN.
LATITUDE: N 35 39 40 LONGITUDE: W 87 01 45

BENEFICIATION:
METHOD: WASHING
---------DESCRIPTION OF MILLING---------
ORE/CRUSHED/SCREENED/WASHED/FINES TO
CYCLONES/TAILINGS TO PONDS/SAND PRODUCT/
TAILINGS TO PONDS/SAND PRODUCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE CONCENTRATE
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: WASHER-COLUMBIA, TENN.
LATITUDE: N 35 39 40 LONGITUDE: W 87 01 45
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 25
DESTINATION FACILITY: SMELTER LOCATION: FURNACE-MT. PLEASANT, TENN.
LATITUDE: N 35 33 00 LONGITUDE: W 87 13 00

BIBLIOGRAPHY RECORDS

SMITH, R.W. AND G. I. WHITLATCH. THE PHOSPHATE RESOURCES OF TENNESSEE. TENN. DIVISION OF GEOLOGY BULL. 48, 444 PP.15. ACTS 1972 (ADJ.S), CH. 547 1940, P. 1.

ZELLARS-WILLIAMS INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF TENNESSEE USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 13-79, 1978. 37 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: M. C. WEST PROPERTIES
SEQUENCE NUMBER: 0471190085

NATION: USA STATE: TENNESSEE
COUNTY: MAURY
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 35 DEG 46 MIN 14 SEC
LONGITUDE: W 87 DEG 16 MIN 56 SEC
UTM - ZONE: 16 HEMISPHERE: NORTHERN
NORTHING: 3958337 EASTING: 474489
POINT OF REFERENCE: ORE BODY
ELEVATION: 215 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
PRIVATE LEASE; FEE OWNERSHIP

ALTERNATE NAMES
TENNESSEE OPERATIONS
HICKMAN AND MAURY CO. PROPERTIES

OWNERSHIP	STATUS
M.C. WEST, INC.	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE	PHOSPHORUS	PRIMARY PRODUCT
FLUORINE		RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
CALCIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR TENNESSEE IS 71.672 MILLION METRIC TONS OF ORE AT AN IN SITU GRADE OF 20.9% P2O5. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF TENNESSEE USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 13 - 79, 1978, 37 PP..

DEPOSIT CONSISTS OF 4 SMALL DEPOSITS IN HICKMAN AND MAURY COUNTIES.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF INITIAL PRODUCTION: 1939

------EXPLORATION METHODS------
AUGER

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; REPLACEMENT; DISSEMINATED
MODE OF ORIGIN: RESIDUAL CONCENTRATION; SEDIMENTATION
SHAPE OF ORE BODY: IRREGULAR; TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

LITHOLOGY:
NAME OF FORMATION: BIGBY-CANNON LIMESTONE GEOLOGIC AGE: MIDDLE ORDOVICIAN
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	OTHER
SILT	GANGUE
CLAY	GANGUE
CHERT	GANGUE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
CALCITE	CARBONATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
100 PERCENT QUICKSAND
PERCENT WASTE ROCK: 71.4
HARDNESS OF ORE:
QUICKSAND
SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LATITUDE: N 35 46 14
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK
DESTINATION FACILITY: MILL (OFF-SITE)
LATITUDE: N 35 47 20
LOCATION: USA TENNESSEE
LONGITUDE: W 87 16 56
DISTANCE (KM): 7.5
LOCATION: USA TENNESSEE
LONGITUDE: W 87 19 30

BENEFICIATION:
METHOD: WASHING
-------DESCRIPTION OF MILLING------
ORE/SLUICED/SCREEN/CRUSH/WASH/
CLASSIFY/CLAY TO DISPOSAL

TRANSPORTATION FOR PRODUCT: PHOSPHATE CONCENTRATE
ORIGINATING FACILITY: MILL (OFF-SITE)
LATITUDE: N 35 47 20
PERCENT SHIPPED: 100
DESTINATION FACILITY: FOB MILL
LOCATION: USA TENNESSEE
LONGITUDE: W 87 19 30

BIBLIOGRAPHY RECORDS

BATES, R.L., TENNESSEE PHOSPHATE DEPOSITS. GEOLOGY OF INDUSTRIAL ROCKS AND MINERALS, DOVER, N.Y., 1969, PP. 187-190.

HERSHEY, R.E., R.J. FLOYD, R.A. MILLER, C.W. WILSON, ET AL. GEOLOGIC MAPS AND MINERAL RESOURCE SUMMARIES. TENN. DIV. OF GEOL., 1963-1970.

SMITH, E.W., AND G.I. WHITLATCH. THE PHOSPHATE RESOURCES OF TENNESSEE. TENN. DIV. OF GEOL. BULL. 48, 1940, 444 PP.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF TENNESSEE USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 13-79, 1978, 37 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MONSANTO PROPERTIES
SEQUENCE NUMBER: 0471190086

NATION: USA STATE: TENNESSEE
COUNTY: MAURY
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 35 DEG 40 MIN 00 SEC
LONGITUDE: W 87 DEG 07 MIN 00 SEC
UTM - ZONE: 16 HEMISPHERE: NORTHERN
NORTHING: 3946784 EASTING: 489440
POINT OF REFERENCE: PLANT
PRECISION: 100 METERS
ELEVATION: 180 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1979

TYPE OF MINERAL HOLDING
MINERALS ONLY; FEE OWNERSHIP;
PRIVATE LEASE

OWNERSHIP	STATUS
MONSANTO INDUSTRIAL CHEMICALS COMPANY	OWNER-OPERATOR
FARMERS CONSTRUCTION COMPANY	OPERATOR
OTHER MINING CONTRACTORS	OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE	PHOSPHORUS	PRIMARY PRODUCT
FLUORINE		RECOVERABLE
IRON	FERRIC OXIDE	AFFECT MARKETABLITY
ALUMINUM	ALUMINA	AFFECT MARKETABLITY
CALCIUM	OXIDE	AFFECT MARKETABLITY
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

THE AGGREGATED 1978 RESERVE-RESOURCE TONNAGE FOR TENNESSEE IS 71.672 MILLION METRIC TONS OF ORE AT AN IN SITU GRADE OF 20.9% P205. THIS TOTAL TONNAGE INCLUDES THE IN SITU, IDENTIFIED RESERVES-RESOURCES OF THIS DEPOSIT.

SOURCE: ZELLARS-WILLIAMS INC. EVALUATION OF PHOSPHATE DEPOSITS OF TENNESSEE USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 13 - 79, 1978, 37 PP..

DEPOSIT CONSISTS OF 49 SMALL DEPOSITS IN GILES, HICKMAN, MARSHALL, MAURY, AND WILLIAMSON COUNTIES.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1935
YEAR OF INITIAL PRODUCTION: 1937

-------EXPLORATION METHODS-------
AUGER

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; REPLACEMENT; DISSEMINATED
MODE OF ORIGIN: RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: IRREGULAR; TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

LITHOLOGY:
NAME OF FORMATION: BIGBY-CANNON LIMESTONE GEOLOGIC AGE: MIDDLE ORDOVICIAN
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES UNDER ORE
SAND	GANGUE
CLAY	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
CALCITE	CARBONATES	VARIABLE
DOLOMITE	CARBONATES	VARIABLE

MINE/MILL INFORMATION
ORE FEED TO MONSANTO PLANT

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER: HARDNESS OF ORE:
100 PERCENT QUICKSAND QUICKSAND
PERCENT WASTE ROCK: 68.0 SLOPE OF PIT: 65 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: USA TENNESSEE
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): <51
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): >51
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: USA TENNESSEE
LATITUDE: N 35 40 00 LONGITUDE: W 87 07 00

BENEFICIATION:
METHOD: WASHING ------DESCRIPTION OF MILLING------
ORE/WASH/SIZE

TRANSPORTATION FOR PRODUCT: PHOSPHATE CONCENTRATE
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: WASHER-COLUMBIA
LATITUDE: N 35 40 00 LONGITUDE: W 87 07 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: CONVEYOR DISTANCE (KM): 0.1
DESTINATION FACILITY: SMELTER(ON-SITE) LOCATION: FURNACE-COLUMBIA
LATITUDE: N 35 40 00 LONGITUDE: W 87 07 00

BIBLIOGRAPHY RECORDS

BATES, R.L. TENNESSEE PHOSPHATE DEPOSITS. GEOLOGY OF INDUSTRIAL ROCKS AND MINERALS, DOVER, N.Y., 1969, PP. 187-190.

BROWN, L. P. THE PHOSPHATE DEPOSITS OF THE SOUTHERN STATES. ENGINEERING ASSOC. OF THE SOUTH, VOL. 15, NO. 8, 1904, PP. 85-118.

HERSHEY, R.E., R.J. FLOYD, R.A. MILLER, C.W. WILSON ET AL. GEOLOGIC MAPS AND MINERAL RESOURCE SUMMARIES. TENN. DIV. OF GEOL., 1963-1970.

SMITH, R.W., AND G.I. WHITLATCH, THE PHOSPHATE RESOURCES OF TENNESSEE. TENN. DIV. OF GEOL. BULL. 48, 1940, 444 PP.

ZELLARS-WILLIAMS, INC. EVALUATION OF THE PHOSPHATE DEPOSITS OF TENNESSEE USING THE MINERALS AVAILABILITY SYSTEM. BUMINES OPEN FILE REPORT 13-79, 1978, 37 PP.

UTAH

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FLAMING GORGE
SEQUENCE NUMBER: 0490090003

NATION: USA STATE: UTAH
COUNTY: DAGGETT
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 40 DEG 56 MIN 00 SEC
LONGITUDE: W 10° DEG 46 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4531876 EASTING: 603833
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 2130 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
FEDERAL LEASE; STATE LEASE;
FEE OWNERSHIP

ALTERNATE NAMES
SHEEP CREEK
SOLS CANYON
HORSESHOE CANYON

OWNERSHIP	STATUS
U.S. GOVERNMENT	OWNER
STATE OF UTAH	OWNER
VARIOUS PRIVATE OWNERS	UNKNOWN

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
UNDIFFERENTIATED	97,100,000	76,100,000	260,400,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1967	1967	1964

	RECORD 4	RECORD 5
UNDIFFERENTIATED	71,700,000	110,800,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1964	1939

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	18.0	WT-PCT
	H2O	0	WT-PCT
2	P2O5	24.0	WT-PCT
	H2O	0	WT-PCT
3	P2O5	18.0	WT-PCT
	H2O	0	WT-PCT
4	P2O5	24.0	WT-PCT
	H2O	0	WT-PCT
5	P2O5	22.9	WT-PCT
	H2O	0	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORDS 1, 2, 3, AND 4: GIVEN GRADE IS CUTOFF GRADE.

RECORDS 1 AND 2: CONSIST OF RESOURCES BETWEEN HORSESHOE CANYON AND SHEEP CREEK ABOVE ENTRY LEVEL.

RECORDS 3 AND 4: CONSIST OF ALL RESOURCES IN THE FLAMING GORGE AREA ABOVE ENTRY LEVEL.

RECORD 5: CONSISTS OF ALL RESOURCES IN THE FLAMING GORGE AREA WITHIN 1150 FEET OF VERTICAL DEPTHS.

SOURCE FOR RECORDS 1 AND 2:
COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

SOURCE FOR RECORDS 3 AND 4:
GERE, W. C. PHOSPHATE IN MINERAL AND WATER RESOURCES OF UTAH. UTAH GEOL. AND MINERALOG. SURVEY BULL. 73, 1964, PP. 195-205.

SOURCE FOR RECORD 5:
WILLIAMS, J. S. PHOSPHATE IN UTAH. UTAH AGR, EXPT. STA. BULL. 290, 1939, 44 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

------EXPLORATION METHODS------
GEOLOGICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PARK CITY FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	NEAR ORE
CHERT	NEAR ORE
SANDSTONE	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

CHENEY, T. M. PHOSPHATE IN UTAH. UTAH GEOL. AND MINERALOG. SURVEY BULL. 59, 1957. 54 PP., 3 PLATES.

CHENEY, T. M., R. A. SMART, P. G. WARING, AND M. A. WARNER. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN UTAH, 1949-51. U.S. GEOL. SURVEY CIRC. 306, 1953, 40 PP.

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1948, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967. 158 PP.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 0H639-011 - DAMES AND MOORE), 1978, 86 PP.

DE VOTO, R. H., AND D. N. STEVENS, EDS. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT 50-54-5903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 1396 PP. PLUS PLATES.

DUNCAN, W. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, 1970, PP. 275-283.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GERE, W. C. PHOSPHATE IN MINERAL AND WATER RESOURCES OF UTAH. UTAH GEOL. AND MINERALOG. SURVEY BULL. 73, 1964, PP. 195-205.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HANSEN, W. R. GEOLOGY OF THE FLAMING GORGE AREA, UTAH, COLORADO-WYOMING. U.S. GEOL. SURVEY PROF. PAPER 490, 1965, 196 PP., 3 PLATES.

HARRIS, R. A., D. F. DAVIDSON, AND B. P. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

KINNEY, D. M. GEOLOGY OF THE UINTA RIVER, BRUSH CREEK AREA, DUCHESNE AND UINTAH COUNTIES, UTAH. U.S. GEOL. SURVEY BULL. 1007, 1955, 185 PP., PLATES.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

RITZMA, H. R. GEOLOGIC ATLAS OF UTAH-DAGGETT COUNTY. UTAH GEOL. AND MINERALOG. SURVEY BULL. 66, 1959, 116 PP.

RULE, A. R., C. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1979, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SCHELL, E. M. SUMMARY OF THE GEOLOGY OF THE SHEEP CREEK CANYON GEOLOGICAL AREA AND VICINITY, DAGGETT COUNTY, UTAH. IN INTERMOUNTAIN ASSOC. OF GEOL. 16TH ANN. FIELD CONF. GUIDEBOOK, 1969, PP. 141-152.

SCHULTZ, A. R. A GEOLOGIC RECONNAISSANCE OF THE UINTA MOUNTAINS, NORTHERN UTAH, WITH SPECIAL REFERENCE TO PHOSPHATE. IN CONTRIBUTIONS TO ECON. GEOL., 1918, PART I. U.S. GEOL. SURVEY BULL. 690, 1919, PP. 31-94, PLATE.

SCHUMACHER, O. L., R. A. PENSE, AND R. B. DAVIS. FEDERAL LAND STATUS IN THE OVERTHRUST BELT OF IDAHO, MONTANA, UTAH, AND WYOMING, 1979. BUMINES SPECIAL REPT. (IN PRESS), TEXT WITH MAPS AND OVERLAYS, 1979.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF UTAH LAND OWNERSHIP AND PUBLIC MANAGEMENT, BASIN - H. U.S. BUR. LAND MANAGEMENT MAP, 1:250,000 SCALE, 1973, 1 SHEET.

U.S. GEOLOGICAL SURVEY. VERNAL, UTAH; COLORADO, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1954, 1 SHEET.

WILLIAMS, J. S. PHOSPHATE IN UTAH. UTAH AGR. EXPT. STA. BULL. 290, 1939, 44 PP.

WILLIAMS, J. S. THE PERMIAN SYSTEM IN THE UINTA MOUNTAIN AREA. IN INTERMOUNTAIN ASSOC. OF GEOL. 16TH ANN. FIELD CONF. GUIDEBOOK, 1969, PP. 153-168.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: WESTERN UINTA RANGE
SEQUENCE NUMBER: 0490130008

NATION: USA STATE: UTAH
COUNTY: DUCHESNE
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 40 DEG 31 MIN 00 SEC
LONGITUDE: W 111 DEG 06 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4484898 EASTING: 491528
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 3000 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
FEDERAL LEASE; FEE OWNERSHIP

ALTERNATE NAMES
MACKENTIRE DRAW
WOLF CREEK
ROCK CREEK VALLEY
FRANSON CANYON
DRY CANYON

OWNERSHIP	STATUS
U.S. GOVERNMENT	OWNER
UINTAH AND OURAY INDIAN RESERVATION	OWNER
VARIOUS PRIVATE OWNERS	UNKNOWN

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
UNDIFFERENTIATED	276,700,000	179,600,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1967	1967

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	11.0	WT-PCT
	H2O	0	WT-PCT
2	P2O5	18.0	WT-PCT
	H2O	0	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORDS 1: GIVEN GRADES ARE CUTOFF GRADES.
AND 2

RECORD 1: CONSISTS OF RESOURCES OVER THE NORTH FLANK OF THE UNITA MOUNTAINS.

RECORD 2: CONSISTS OF RESOURCES OVER THE SOUTH FLANK OF THE UNITA MOUNTAINS.

SOURCE FOR RECORDS 1 AND 2:
COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD: ------EXPLORATION METHODS------
ORE-MINERAL IN PLACE GEOLOGICAL
YEAR OF DISCOVERY: 1914

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PARK CITY FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	NEAR ORE
CHERT	NEAR ORE
SANDSTONE	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

CHENEY, T. M. PHOSPHATE IN UTAH. UTAH GEOL. AND MINERALOG. SURVEY BULL. 59, 1957, 54 PP., 3 PLATES.

CHENEY, T. M., AND R. P. SHELDON. PERMIAN STRATIGRAPHY AND OIL POTENTIAL - WYOMING AND UTAH. IN INTERMOUNTAIN ASSOC. OF PETROLEUM GEOL. 10TH ANN. FIELD CONF., 1959, PP. 90-100.

CHENEY, T. M., R. A. SMART, R. G. WARING, AND M. A. WARNER. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN UTAH, 1949-51. U.S. GEOL. SURVEY CIRC. 306, 1953, 40 PP.

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1946, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 08699-011 - DAMES AND MOORE), 1978, 86 PP.

DE VOTO, R. H., AND D. N. STEVENS, EDS. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT 50-54-5903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 1396 PP. PLUS PLATES.

DUNCAN, W. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EMERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, PP. 275-283.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GERE, W. C. PHOSPHATE IN MINERAL AND WATER RESOURCES OF UTAH. UTAH GEOL. AND MINERALOG. SURVEY BULL. 73, 1964, PP. 195-205.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HARRIS, R. A., C. F. DAVIDSON, AND B. P. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

HUDDLE, J. W., AND F. T. MCCANN. GEOLOGIC MAP OF DUCHESNE RIVER AREA, WASATCH AND DUCHESNE COUNTIES, UTAH. U.S. GEOL. SURVEY OIL AND GAS INV. PRELIM. MAP PM-75, 1974.

HUDDLE, J. W., W. J. MAPEL, AND F. T. MCCANN. GEOLOGY OF THE MOON LAKE AREA, DUCHESNE COUNTY, UTAH. U.S. GEOL. SURVEY OIL AND GAS INV. MAP OM-115, 1951.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

RULE, A. R., C. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1979, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SCHULTZ, A. R. A GEOLOGIC RECONNAISSANCE OF THE UINTA MOUNTAINS, NORTHERN UTAH, WITH SPECIAL REFERENCE TO PHOSPHATE. IN CONTRIBUTIONS TO ECON. GEOL., 1918, PART I. U.S. GEOL. SURVEY BULL. 690, 1919, PP. 31-94, PLATE.

SCHUMACHER, O. L., R. A. PENSE, AND R. B. LAVIS. FEDERAL LAND STATUS IN THE OVERTHRUST BELT OF IDAHO, MONTANA, UTAH, AND WYOMING, 1979. BUMINES SPECIAL REPT. (IN PRESS), TEXT WITH MAPS AND OVERLAYS, 1979.

SMITH, L. E., E. G. HOSFORD, R. S. SEARS, D. P. SPROUSE, AND M. D. STEWART. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN UTAH, 1947-48. U.S. GEOL. SURVEY CIRC. 211, 1952, 48 PP.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF UTAH LAND OWNERSHIP AND PUBLIC MANAGEMENT, WASATCH - F. U.S. BUR. LAND MANAGEMENT MAP, 1:250,000-SCALE, 1973, 1 SHEET.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF WYOMING LAND STATUS. U.S. BUR. OF LAND MANAGEMENT MAP, 1:500,000 SCALE, 1978, 1 SHEET.

WILLIAMS, J. S. PHOSPHATE IN UTAH. UTAH AGR. EXPT. STA. BULL. 290, 1942, 44 PP.

WILLIAMS, J. S. THE PERMIAN SYSTEM IN THE UINTA 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY 1:250,000-SCALE MAP, 1969, 1 SHEET.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CRAWFORD MOUNTAINS
SEQUENCE NUMBER: 0490330008

NATION: USA STATE: UTAH
COUNTY: RICH
TYPE OF OPERATION: SURFACE-UNDERGROUND
CURRENT STATUS: PAST PRODUCER
LATITUDE: N 41 DEG 38 MIN 00 SEC
LONGITUDE: W 111 DEG 06 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4608858 EASTING: 491670
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 1920 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
PATENTED CLAIM; FEDERAL LEASE;
STATE LEASE

ALTERNATE NAMES

ARICKAREE MINE	EMMA MINE	SIOUX MINE
CHEROKEE MINE	TUSCARORA MINE	PEARL MINE
PAWNEE MINE	REX PEAK MINE	CRAWFORD GROUP
MANDAN MINE	BRADLEY MINE	

OWNERSHIP	STATUS
U.S. GOVERNMENT	OWNER
STAUFFER CHEMICAL COMPANY	OWNER
VARIOUS PRIVATE OWNERS	UNKNOWN

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
UNDIFFERENTIATED	197,000,000	111,000,000	29,700,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1967	1967	1967

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	18.0	WT-PCT
	H2O	0	WT-PCT
2	P2O5	24.0	WT-PCT
	H2O	0	WT-PCT
3	P2O5	31.0	WT-PCT
	H2O	0	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORDS 1, GIVEN GRADE IS CUTOFF GRADE.
2, AND 3:

SOURCE FOR RECORDS 1, 2, AND 3:
COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
------EXPLORATION METHODS-------
GEOLOGICAL
YEAR OF DISCOVERY: 1904
YEAR OF INITIAL PRODUCTION: 1907
YEAR OF FINAL PRODUCTION: 1975

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	NEAR ORE
CHERT	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

BEALL, J. V., AND P.C. MERRITT. PHOSPHATE AND POTASH--MINERALS TO FEED THE WORLD. MIN. ENG., OCTOBER 1966, PP. 75-99.

CHENEY, T. M. PHOSPHATE IN UTAH. UTAH GEOL. AND MINERALOG. SURVEY BULL. 58, 1957, 54 PP., 3 PLATES.

CHENEY, T. M., P. A. SMART, R. G. WARING, AND M. A. WARNER. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN UTAH, 1949-51. U.S. GEOL. SURVEY CIRC. 306, 1953, 40 PP.

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1946, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. UH699-C11 - DAMES AND MOORE), 1978, 86 PP.

DAY, P. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUR. MINES AND GEOL. PAMPH. 155, 1973, 63 PP., 1 PLATE.

DE VOTO, R. H., AND D. N. STEVENS, EDS. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT E0-84-5903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 1396 PP. PLUS PLATES.

DUNCAN, W. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, 1970, PP. 275-283.

GALE, H. S., AND R. W. RICHARDS. PHOSPHATES. IN U.S. GEOL. SURVEY BULL. 430, 1910, PP. 457-553.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GERE, W. C. PHOSPHATE. IN MINERAL AND WATER RESOURCES OF UTAH, UTAH GEOL. AND MINERALOG. SURVEY BULL. 73, 1964, PP. 195-205.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 95-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HARRIS, R. A., D. F. DAVIDSON, AND B. P. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

MABIE, C. P. AND H. D. HESS. PETROGRAPHIC STUDY AND CLASSIFICATION OF WESTERN PHOSPHATE ORES. BUMINES RI 6468, 1964, 95 PP.

MANSFIELD, G. R. GEOGRAPHY, GEOLOGY, AND MINERAL RESOURCES OF PART OF SOUTHEASTERN IDAHO. U.S. GEOL. SURVEY PROF. PAPER 152, 1927, 453 PP., 12 PLATES.

MCKELVEY, V. E. PRELIMINARY REPORT ON STRATIGRAPHY OF THE PHOSPHATIC SHALE MEMBER OF THE PHOSPHORIA FORMATION IN WESTERN WYOMING, SOUTHEASTERN IDAHO, AND NORTHERN UTAH. U.S. GEOL. SURVEY UNPUB, REPT., 1946, 162 PP. OBTAINED FROM U.S. GEOL. SURVEY CONSERV. DIV. OFFICE IN ROCK SPRINGS, WYO.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

RICHARDSON, G. B. GEOLOGY AND MINERAL RESOURCES OF THE RANDOLPH QUADRANGLE, UTAH - WYOMING. U.S. GEOL. SURVEY BULL. 923, 1941, 54 PP., PLATE.

RULE, A. R., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1979, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SCHUMACHER, O. L., R. A. PENSE, AND R. B. DAVIS. FEDERAL LAND STATUS IN THE OVERTHRUST BELT OF IDAHO, MONTANA, UTAH, AND WYOMING, 1979. BUMINES SPECIAL REPT. (IN PRESS), 1979, TEXT WITH MAPS AND OVERLAYS.

SMITH, L. E., E. G. HOSFORD, R. S. SEARS, D. P. SPROUSE, AND M. D. STEWART. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN UTAH, 1947-48. U.S. GEOL. SURVEY CIRC. 211, 1952, 30 PP.

SWANSON, R. W., L. D. CARSWELL, R. P. SHELDON, AND T. M. CHENEY. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION, 1953. U.S. GEOL. SURVEY CIRC. 375, 1956, 30 PP.

U.S. GEOLOGICAL SURVEY. OGDEN, UTAH; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1954, 1 SHEET.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF UTAH LAND OWNERSHIP AND PUBLIC MANAGEMENT, BEAR LAKE - C. U.S. BUR. LAND MANAGEMENT MAP, 1:250,000 SCALE, 1978, 1 SHEET.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF WYOMING LAND STATUS. U.S. BUR. OF LAND MANAGEMENT MAP, 1:500,000 SCALE, 1978, 1 SHEET.

WING, D. L., SR. SAN FRANCISCO CHEMICAL CO., CRAWFORD MOUNTAIN - LEEFE AREA, UTAH AND WYOMING. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 203-209.

WIDEMAN, F. L. MINING INCLINED BED OF PHOSPHATE ROCK, SAN FRANCISCO CHEMICAL CO. MINES, RICH COUNTY, UTAH. BUMINES IC 7849, 1958, 27 PP.

WILLIAMS, J. S. PHOSPHATE IN UTAH. UTAH AGR. EXPT. STA. BULL. 290, 1942, 44 PP.

WILLIAMS, J. S., AND A. M. HANSON. THE PHOSPHATE RESERVES OF UTAH. UTAH AGR. EXPT. STA. BULL. 304, 23 PP.

WYOMING NATURAL RESOURCE BOARD. WYOMING PHOSPHATE, IN REVIEW AND FORECAST - WYOMING MINERAL INDUSTRIES, BOOK III (NON-FUEL MINERALS), REPT. BY CAMERON ENGINEERS, 1969, PP. 230-276.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NORTHERN WASATCH RANGE
SEQUENCE NUMBER: 0490330009

NATION: USA STATE: UTAH
COUNTY: RICH
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 41 DEG 28 MIN 00 SEC
LONGITUDE: W 111 DEG 22 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4590415 EASTING: 469380
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 2045 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
MINERALS ONLY; FEE OWNERSHIP

ALTERNATE NAMES
DRY BREAD HOLLOW
WOODRUFF CREEK

OWNERSHIP	STATUS
U.S. GOVERNMENT	OWNER
VARIOUS PRIVATE OWNERS	UNKNOWN

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
UNDIFFERENTIATED	3,200,000	5,100,000	2,300,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1967	1967	1967

	RECORD 4	RECORD 5	RECORD 6
UNDIFFERENTIATED	41,000,000	25,900,000	453,600,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1964	1964	1969

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	18.0	WT-PCT
	H2O	0	WT-PCT
2	P2O5	24.0	WT-PCT
	H2O	0	WT-PCT
3	P2O5	31.0	WT-PCT
	H2O	0	WT-PCT
4	P2O5	18.0	WT-PCT
	H2O	0	WT-PCT
5	P2O5	24.0	WT-PCT
	H2O	0	WT-PCT
6	P2O5	18.0	WT-PCT
	H2O	0	WT-PCT

RESERVE-RESOURCE - REMARKS

ALL RECORDS: GIVEN GRADES ARE CUTOFF GRADES.

RECORD 1: CONSISTS OF RESOURCES IN LAKETOWN CANYON PER 100 FEET OF VERTICAL DEPTH.
RECORDS 2 AND 3: CONSISTS OF RESOURCES AT WOODRUFF CRREK AND LAKETOWN CANYON PER 100 FEET OF DEPTH.
RECORDS 4 AND 5: CONSIST OF RESOURCES AT DRY BREAD HOLLOW.
RECORD 6: CONSIST OF RESOURCES SOUTH OF DRY BREAD HOLLOW UNDER TERTIARY COVER.

SOURCE FOR RECORDS 1, 2, AND 3:
COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

SOURCE FOR RECORDS 4 AND 5:
SCHELL, E. M. PRELIMINARY REPORT ON THE PHOSPHATE DEPOSITS AND STRATIGRAPHY OF PERMIAN ROCKS IN DRY BREAD HOLLOW, HEBER COUNTY, UTAH. U.S. GEOL. SURVEY OPEN FILE REPT. 64-138, 1964, 38 PP., PLATE.

SOURCE FOR RECORD 6:
MULLENS, T. E. GEOLOGIC MAP OF THE CAUSEY DAM QUADRANGLE, WEBER COUNTY, UTAH. U.S. GEOL. SURVEY GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-790, 1969.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD: ------EXPLORATION METHODS------
ORE-MINERAL IN PLACE GEOLOGICAL
YEAR OF DISCOVERY: 1889

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PARK CITY FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	NEAR ORE
CHERT	NEAR ORE
SANDSTONE	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

BLACKWELDER, E. PRELIMINARY REPORT ON THE PHOSPHATE DEPOSITS IN SOUTHEASTERN IDAHO AND ADJACENT PARTS OF WYOMING AND UTAH. IN CONTRIBUTIONS TO ECON. GEOL., PART I - METALS AND NONMETALS EXCEPT FUELS. U.S. GEOL. SURVEY BULL. 430, 1910, PP. 536-551.

CHENEY, T. M. PHOSPHATE IN UTAH. UTAH GEOL. AND MINERALOG. SURVEY BULL. 59, 1957, 54 PP., 3 PLATES.

CHENEY, T. M., R. A. SMART, R. G. WARING, AND M. A. WARNER. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN UTAH, 1949-51. U.S. GEOL. SURVEY CIRC. 306, 1953, 40 PP.

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1946, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DE VOTO, R. H., AND D. N. STEVENS, EDS. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT EO-54-5903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 1396 PP. PLUS PLATES.

GERE, W. C. PHOSPHATE IN MINERAL AND WATER RESOURCES OF UTAH. UTAH GEOL. AND MINERALOG. SURVEY BULL. 73, 1964, PP. 195-205.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 08699-011 - DAMES AND MOORE), 1978, 86 PP.

DUNCAN, W. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EREL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION. THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, PP. 275-283.

GALE, H. S., AND R. W. RICHARDS. PHOSPHATES. IN U.S. GEOL. SURVEY BULL. 430, 1910, PP. 457-553.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HARRIS, R. A., C. F. DAVIDSON, AND B. P. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

MULLENS, T. E. GEOLOGIC MAP OF THE CAUSEY DAM QUADRANGLE, WEBER COUNTY, UTAH. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-790, 1969.

MULE, A. F., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1979, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SCHELL, E. M. PRELIMINARY REPORT ON THE PHOSPHATE DEPOSITS AND STRATIGRAPHY OF PERMIAN ROCKS IN DRY BREAD HOLLOW, HEBER COUNTY, UTAH. U.S. GEOL. SURVEY OPEN FILE REPT. 64-138, 1964, 38 PP., PLATE.

SCHELL, E. M., AND K. P. MOORE. STRATIGRAPHIC SECTIONS AND CHEMICAL ANALYSES OF PHOSPHATIC ROCKS OF PERMIAN AND MISSISSIPPIAN AGE IN WEBER COUNTY, UTAH. U.S. GEOL. SURVEY CIRC. 635, 1970, 11 PP.

SCHUMACHER, O. L., R. A. PENSE, AND R. B. DAVIS. FEDERAL LAND STATUS IN THE OVERTHRUST BELT OF IDAHO, MONTANA, UTAH, AND WYOMING, 1979. BUMINES SPECIAL REPT. (IN PRESS), TEXT WITH MAPS AND OVERLAYS, 1979.

SWANSON, R. W., L. D. CARSWELL, R. P. SHELDON, AND T. M. CHENEY. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION, 1953. U.S. GEOL. SURVEY CIRC. 375, 1956, 30 PP.

U.S. GEOLOGICAL SURVEY. OGDEN, UTAH; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1954, 1 SHEET.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF UTAH LAND OWNERSHIP AND PUBLIC MANAGEMENT, BEAR LAKE - C. U.S. BUR. LAND MANAGEMENT MAP, 1:250,000 SCALE, 1978, 1 SHEET.

WILLIAMS, J. S. PHOSPHATE IN UTAH. UTAH AGR, EXPT. STA. BULL. 290, 1942, 44 PP.

WILLIAMS, J. S., AND A. M. HANSON. THE PHOSPHATE RESERVES OF UTAH. UTAH AGR. EXPT. STA. BULL 304, 1942, 23 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CENTRAL WASATCH RANGE
SEQUENCE NUMBER: 0490350098

NATION: USA STATE: UTAH
TYPE OF OPERATION: PROSPECT
LATITUDE: N 40 DEG 39 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 2165 METERS
DATUM: SEA LEVEL

COUNTY: SALT LAKE
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 111 DEG 34 MIN 00 SEC
NORTHING: 4499847 EASTING: 452089
PRECISION: 10 KILOMETERS
PRECISION: 100 METERS
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
U.S. GOVERNMENT	OWNER
STATE OF UTAH	OWNER
VARIOUS PRIVATE OWNERS	UNKNOWN

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U308 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3	RECORD 4
UNDIFFERENTIATED	18,300,000	8,100,000	16,400,000	11,300,000
UNITS	MT ORE	MT ORE	MT ORE	MT ORE
YEAR/DATA	1942	1942	1967	1967

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	32.6	WT-PCT
	H2O	0	WT-PCT
2	P2O5	32.6	WT-PCT
	H2O	0	WT-PCT
3	P2O5	18.0	WT-PCT
	H2O	0	WT-PCT
4	P2O5	24.0	WT-PCT
	H2O	0	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: CONSISTS OF RESOURCES WITHIN 1500 FEET OF VERTICAL DEPTH IN THE MILL CREEK - BIG COTTONWOOD CANYON TREND.

RECORD 2: CONSISTS OF RESOURCES WITHIN 1500 FEET OF VERTICAL DEPTH OVER 2 OUTCROPS IN THE SOUTHERN PART OF THE HEBER CITY - PARK CITY VICINITY.

RECORDS 3 AND 4: CONSISTS OF ABOVE ENTR LEVEL RESOURCES IN THE EMMIGRANT CANYON TREND. GIVEN GRADES ARE CUTOFF GRADES.

SOURCE FOR RECORDS 1 AND 2:
WILLIAMS, J. S., AND A.M. HANSON THE PHOSPHATE RESERVES OF UTAH. UTAH AGR. EXPT. STA. BULL. 304, 1942, 23 PP.

SOURCE FOR RECORDS 3 AND 4:
COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

------EXPLORATION METHODS------
GEOLOGICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PARK CITY FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	NEAR ORE
CHERT	NEAR ORE
SANDSTONE	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

BAKER, A. A. GEOLOGY OF THE ASPEN GROVE QUADRANGLE, UTAH. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-239, 1964.

BAKER, A. A., AND M. D. CRITTENDEN, JR. GEOLOGY OF THE TIMPANOGOS CAVE QUADRANGLE, UTAH. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-132, 1961.

BAKER, A. A., F. C. CALKINS, M. D. CRITTENDEN, JR., AND C. S. BROMFIELD. GEOLOGIC MAP OF THE BRIGHTON QUADRANGLE, UTAH. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-534, 1966.

BROMFIELD, C. S., A. A. BAKER, AND M. D. CRITTENDEN, JR. GEOLOGIC MAP OF THE WEBER QUADRANGLE, WASATCH AND SUMMIT COUNTIES, UTAH. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-864, 1970.

BROMFIELD, C. S., AND M. D. CRITTENDEN, JR. GEOLOGIC MAP OF THE PARK CITY EAST QUADRANGLE, SUMMIT AND WASATCH COUNTIES, UTAH. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-852, 1971.

CHENEY, T. M. PHOSPHATE IN UTAH. UTAH GEOL. AND MINERALOG. SURVEY BULL. 58, 1957, 54 PP., 3 PLATES., 23 PP.

CHENEY, T. M., P. A. SMART, R. G. WARING, AND M. A. WARNER. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN UTAH, 1949-51. U.S. GEOL. SURVEY CIRC. 306, 1953, 40 PP.

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1946, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

CRAWFORD, A. L., ED. GEOLOGY OF SALT LAKE COUNTY. UTAH GEOL. AND MINERALOG. SURVEY BULL. 69, 1964, 192 PP., PLATES.

CRITTENDEN, M. D., JR. GEOLOGY OF THE DROMEDARY PEAK QUADRANGLE, UTAH. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-378, 1965.

CRITTENDEN, M. D., JR. GEOLOGY OF THE MOUNT AIRE QUADRANGLE, SALT LAKE COUNTY, UTAH. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-379, 1965.

CRITTENDEN, M. D., JR. GEOLOGY OF THE SUGAR HOUSE QUADRANGLE, SALT LAKE COUNTY, UTAH. U.S. GEOL. SURVEY, 1965.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 08699-011 - DAMES AND MOORE), 1978, 86 PP.

DEVOTO, R. H., AND D. N. STEVENS, EDS. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT 50-54-5903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 2396 PP. PLUS PLATES.

DUNCAN, W. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, PP. 275-283.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1101 PP.

GERE, W. C. PHOSPHATE. IN MINERAL AND WATER RESOURCES OF UTAH, UTAH GEOL. AND MINERALOG. SURVEY BULL. 73, 1964, PP. 195-205.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 287 PP., 1967, 3 PLATES.

HARRIS, R. A., D. F. DAVIDSON, AND B. P. ARNOLDP. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

MULLENS, T. E., AND T. H. COLE. GEOLOGIC MAP OF THE NORTHEAST QUARTER OF THE MORGAN 15-MINUTE QUADRANGLE, MORGAN AND WEBER COUNTIES, UTAH. U.S. GEOL. SURVEY MIN. INV. FIELD STUDIES MAP MF-304, 1972.

MULLENS, T. E., AND W. H. LARAWAY. GEOLOGY OF THE DEVILS SLIDE QUADRANGLE, MORGAN AND SUMMIT COUNTIES, UTAH. U.S. GEOL. SURVEY MIN. INV. FIELD STUDIES MAP MF-290, 1964.

RULE, A. R., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1979, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977. 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SCHUMACHER, O. L., R. A. PENSE, AND R. B. DAVIS. FEDERAL LAND STATUS IN THE OVERTHRUST BELT OF IDAHO, UTAH, AND WYOMING, 1979. BUMINES SPECIAL REPT. (IN PRESS), TEXT WITH MAPS AND OVERLAYS, 1979.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF UTAH LAND OWNERSHIP AND PUBLIC MANAGEMENT, WASATCH - F. U.S. BUR. LAND MANAGEMENT MAP, 1:250,000 SCALE, 1973, 1 SHEET.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF UTAH LAND OWNERSHIP AND PUBLIC MANAGEMENT, BEAR LAKE - C. U.S. BUR. LAND MANAGEMENT MAP, 1:250,000 SCALE, 1978, 1 SHEET.

U.S. GEOLOGICAL SURVEY. OGDEN, UTAH; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1954, 1 SHEET.

U.S. GEOLOGICAL SURVEY. SALT LAKE CITY, UTAH; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1954, 1 SHEET.

VAN HORN, RICHARD. PRELIMINARY GEOLOGIC MAP OF THE SOUTHERN HALF OF THE FORT DOUGLAS QUADRANGLE, SALT LAKE COUNTY, UTAH. U.S. GEOL. SURVEY OPEN FILE REPT. 69-308, 1969, 6 PP., PLATES.

WILLIAMS, J. S. PHOSPHATE IN UTAH. UTAH AGR. EXPT. STA. BULL. 290, 1939, 44 PP.

WILLIAMS, J. S., AND A. M. HAMSON. THE PHOSPHATE RESERVES OF UTAH. UTAH AGR. EXPT. STA. BULL. 304, 1942, 23 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: VERNAL MINE
SEQUENCE NUMBER: 0490470028

NATION: USA STATE: UTAH
COUNTY: UINTAH
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 40 DEG 36 MIN 05 SEC
LONGITUDE: W 109 DEG 29 MIN 25 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4495393 EASTING: 627737
POINT OF REFERENCE: PLANT
PRECISION: 100 METERS
ELEVATION: 1829 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
PATENTED CLAIMS

OWNERSHIP
CHEVRON

STATUS
OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U308 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
UNDIFFERENTIATED	454,000,000	635,000,000	640,000,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1967	1966	1966

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	16	WT-PCT
2	P205	18	WT-PCT
3	P205	20	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: 16 PERCENT P205 IS CUTOFF GRADE.
RECORD 2: 18 PERCENT P205 IS CUTOFF GRADE.

SOURCE FOR RECORD 1:
COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

SOURCE FOR RECORD 2:
SERVICE, A. L. HISTORY & DEVELOPMENT OF THE PHOSPHATE INDUSTRY AND ITS
RESOURCE, PART 4, WYOMING & UTAH. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 173-185.

SOURCE FOR RECORD 3:
BEALL, J. V., AND P. C. MERRITT. PHOSPHATE AND POTASH--MINERALS TO FEED THE WORLD. MIN. ENG., OCTOBER 1966, PP. 75-99.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
------EXPLORATION METHODS-------
GEOLOGICAL
YEAR OF DISCOVERY: 1915
YEAR OF INITIAL PRODUCTION: 1961

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; FOLDING
DEGREE OF WALL ROCK ALTERATION: NONE

MINERALIZED ZONE:
  AVERAGE DEPTH: 15 METERS
  MINIMUM DEPTH: 0 METERS
  AVERAGE LENGTH: 15000 METERS
  STRIKE/DIP: S70W/07S
  AVERAGE WIDTH: 4000 METERS
  AVERAGE THICKNESS: 6.1 METERS

UNCONSOLIDATED MATERIAL:
  AVERAGE THICKNESS: 1 METER
  MINIMUM THICKNESS: 0 METER

LITHOLOGY:
  NAME OF FORMATION: PARK CITY FORMATION
  GEOLOGIC AGE: UPPER PERMIAN
  DEFORMATION DESCRIPTION: MINOR FOLDING
  RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
    GEOLOGIC AGE: BEFORE CRETACEOUS
  ROCK TYPE:
    PHOSPHORITE IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
  METHOD: STRIPPING
  DESCRIPTION OF COVER:
  MEDIUM-HARD ROCKS
  AVERAGE COVER THICKNESS: 15 METERS
  HARDNESS OF ORE:
    MEDIUM-HARD ROCKS
  SURFACE AREA OF MINE: 5990 HECTARES

TRANSPORTATION (ORE):
  ORIGINATING FACILITY: MINE
  LOCATION: VERNAL MINE
  LATITUDE: N 40 36 05
  LONGITUDE: W 109 29 25
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: TRUCK
  DESTINATION FACILITY: MILL (ON-SITE)
  LOCATION: VERNAL MILL
  LATITUDE: N 40 36 05
  LONGITUDE: W 109 29 25

BENEFICIATION:
  METHOD: FLOTATION
------- DESCRIPTION OF MILLING -------
ORE CRUSHED/DESLIMED/P2O5 FLOAT

TRANSPORTATION FOR PRODUCT: ACID GRADE P2O5
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: VERNAL MILL
LATITUDE: N 40 36 05 LONGITUDE: W 109 29 25
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK; RAIL
DESTINATION FACILITY: REFINERY

BIBLIOGRAPHY RECORDS

BEALL, J. V., AND P. C. MERRITT. PHOSPHATE AND POTASH--MINERALS TO FEED THE WORLD. MIN. ENG., OCTOBER 1966, PP. 75-99.

CHENEY, T. M. PHOSPHATE IN UTAH. UTAH GEOL. AND MINERALOG. SURVEY BULL. 59, 1957, 54 PP., 3 PLATES.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, P. 136.

DAY, R. L. TRENDS IN THE PHOSPHATE INDUSTRY OF IDAHO AND THE WESTERN PHOSPHATE FIELD. IDAHO BUR. MINES AND GEOL. PAMPH. 155, 1973, 63 PP., 1 PLATE.

GERE, W. C. PHOSPHATE. IN MINERAL AND WATER RESOURCES OF UTAH, UTAH GEOL. AND MINERALOG. SURVEY BULL. 73, 1964, PP. 195-205.

KING, D. L., JR. SAN FRANCISCO PHOSPHATE DEPOSIT IN THE UINTA BASIN. IN INTERMOUNTAIN ASSOC. OF PETROLEUM GEOL. 13TH ANN. FIELD CONF., 1964, PP. 259-263.

KINNEY, D. M. GEOLOGY OF THE UINTA RIVER, BRUSH CREEK AREA, DUCHESNE AND UINTAH COUNTIES, UTAH. U.S. GEOL. SURVEY BULL. 1007, 1955, 185 PP., PLATES.

KINNEY, D. M. GEOLOGY OF THE UINTA RIVER AND BRUSH CREEK-DIAMOND MOUNTAIN AREAS, DUCHESNE AND UINTAH COUNTIES, UTAH. U.S. GEOL. SURVEY OIL AND GAS INV. MAP OM-123, 1957.

PRUITT, R. G., JR. PHOSPHATE. IN MINERAL RESOURCES OF UINTAH COUNTY, UTAH GEOL. AND MINERALOG. SURVEY BULL. 71, 1961, PP. 74-87.

RHODES, J. A. REVIEW OF THE WESTERN PHOSPHATE FIELD. MONT. BUR. OF MINES AND GEOL. SPECIAL PUB. 74, 1976, PP. 61- 67.

SCHELL, E. M., AND DYNI, J. R. PRELIMINARY GEOLOGIC STRIP MAPS OF THE PARK CITY AND PHOSPHORIA FORMATIONS, VERNAL PHOSPHATE AREA, UINTAH COUNTY, UTAH. U.S. GEOL. SURVEY OPEN-FILE REPT. 73-248, 1973, 8 SHEETS.

SCHULTZ, A. R. A GEOLOGIC RECONNAISSANCE OF THE UINTA MOUNTAINS, NORTHERN UTAH, WITH SPECIAL REFERENCE TO PHOSPHATE. IN CONTRIBUTIONS TO ECON. GEOL., 1918, PART I, U.S. GEOL. SURVEY BULL. 690, 1919, PP. 31-94, PLATE.

SCHUMACHER, O. L., R. A. PENSE, AND R. B. DAVIS. FEDERAL LAND STATUS IN THE OVERTHRUST BELT OF IDAHO, MONTANA, UTAH, AND WYOMING, 1979. BUMINES SPECIAL REPT. (IN PRESS), TEXT WITH MAPS AND OVERLAYS, 1979.

SERVICE, A.L. HISTORY & DEVELOPMENT OF THE PHOSPHATE INDUSTRY IN SOUTHEASTERN IDAHO. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 173-185.

STAUFFER CHEMICAL COMPANY. 1961-67, 1973, 1974, AND 1978 ANNUAL REPORTS.

UNTERMANN, G. E., B. R. UNTERMANN, AND D. M. KINNEY. GEOLOGY OF UINTAH COUNTY. UTAH GEOL. AND MINERALOG. SURVEY BULL. 72, 1964, 2 PLATES.

U.S. GEOLOGICAL SURVEY. VERNAL, UTAH; COLORADO, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1954, 1 SHEET.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF UTAH LAND OWNERSHIP AND PUBLIC MANAGEMENT, BASIN - H., U.S. BUR. LAND MANAGEMENT MAP, 1:250,000 SCALE, 1973, 1 SHEET.

WILLIAMS, J. S. PHOSPHATE IN UTAH. UTAH AGR. EXPT. STA. BULL. 290, 1942, 44 PP.

WILLIAMS, J. S. THE PERMIAN SYSTEM IN THE UINTA MOUNTAIN AREA. IN INTERMOUNTAIN ASSOC. OF GEOL. 16TH ANN. FIELD CONF. GUIDEBOOK, 1969, PP. 153-168.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: VERNAL FIELD
SEQUENCE NUMBER: 0490470057

NATION: USA STATE: UTAH
COUNTY: UINTAH
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 40 DEG 35 MIN 00 SEC
LONGITUDE: W 109 DEG 36 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4493235 EASTING: 618485
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 2130 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; MINERALS ONLY

ALTERNATE NAMES
BRUSH CREEK
ASHLEY CREEK
LITTLE BRUSH CREEK
DRY FORK
ROCK CREEK CANYON
LITTLE DIAMOND MOUNTIAN
SPLIT MOUNTIAN

OWNERSHIP	STATUS
U.S. GOVERNMENT	OWNER
UNIDENTIFIED OWNER	OWNER
STATE OF UTAH	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3	RECORD 4
UNDIFFERENTIATED	111,900,000	209,600,000	70,100,000	829,300,000
UNITS	MT ORE	MT ORE	MT ORE	MT ORE
YEAR/DATA	1955	1955	1955	1967

	RECORD 5	RECORD 6	RECORD 7	RECORD 8
UNDIFFERENTIATED	751,800,000	119,800,000	7,500,000	1,524,000,000
UNITS	MT ORE	MT ORE	MT ORE	MT ORE
YEAR/DATA	1967	1967	1939	1939

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	20.0	WT-PCT
	H20	0	WT-PCT
2	P205	20.0	WT-PCT
	H20	0	WT-PCT
3	P205	20.0	WT-PCT
	H20	0	WT-PCT
4	P205	16.0	WT-PCT
	H20	0	WT-PCT
5	P205	18.0	WT-PCT
	H20	0	WT-PCT
6	P205	16.0	WT-PCT
	H20	0	WT-PCT
7	P205	20.2	WT-PCT
	H20	0	WT-PCT
8	P205	18.3	WT-PCT
	H20	0	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORDS 1, 2, AND 3: GIVEN GRADES ARE AVERAGED FOR ALL OUTCROPS EAST OF ASHLEY CREEK.

RECORDS 4, 5, AND 6: GIVEN GRADES ARE CUTOFF GRADES.

RECORD 1: CONTAINS RESOURCES ABOVE STREAM LEVEL IN T2S R23E EAST OF LITTLE BRUSH CREEK.

RECORD 2: CONTAINS RESOURCES ABOVE STREAM LEVEL EAST OF ASHLEY CREEK IN T3S R21E.

RECORD 3: CONTAINS RESOURCES ABOVE STREAM LEVEL WEST OF ASHLEY CREEK IN T3S R20E.

RECORD 4: CONTAINS ABOVE DRAINAGE LEVEL RESOURCES BETWEEN ASHLEY CREEK AND BRUSH CREEK, INCLUDING PART OF THE VERNAL MINE AREA.

RECORD 5: CONTAINS ABOVE DRAINAGE LEVEL RESOURCES BETWEEN BRUSH CREEK AND LITTLE DIAMOND MOUNTAIN.

RECORD 6: CONSISTS OF RESOURCES OVER ALL OUTCROPS WEST OF THE DIVIDE BETWEEN ASHLEY CREEK AND DRY FORK.

RECORD 7: CONSISTS OF RESOURCES WITHIN 1250 FEET OF VERTICAL DEPTH OVER A 3-MILE OUTCROP ACROSS WHITEROCKS RIVER.

RECORD 8: CONSISTS OF RESOURCES OVER THE ENTIRE OUTCROP AREA EAST OF DRY FORK, INCLUDING THE VERNAL MINE AREA.

SOURCE FOR RECORDS 1, 2, AND 3:
KINNEY, D.M. GEOLOGY OF THE UINTA RIVER, BRUSH CREEK AREA, DUCHESNE AND UINTAH COUNTIES, UTAH. U.S. GEOL. SURVEY BULL. 1007, 1955, 185 PP., PLATES.

SOURCE FOR RECORDS 4, 5, AND 6:
COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

SOURCE FOR RECORDS 7 AND 8:
WILLIAMS, J. S. PHOSPHATE IN UTAH. UTAH AGR. EXPT. STA. BULL. 290, 1939, 44 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1914

------EXPLORATION METHODS------
GEOLOGICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PARK CITY FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	NEAR ORE
CHERT	NEAR ORE
SANDSTONE	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

CHENEY, T. M. PHOSPHATE IN UTAH. UTAH GEOL. AND MINERALOG. SURVEY BULL. 59, 1957, 54 PP., 3 PLATES.

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1946, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DE VOTO, R. H., AND D. N. STEVENS, EDS. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT 50-54-5903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 1396 PP. PLUS PLATES.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 08699-011 - DAMES AND MOORE), 1978, 86 PP.

DUNCAN, W. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, PP. 275-283.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HARRIS, R. A., D. F. DAVIDSON, AND B. P. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

KINNEY, D. M. GEOLOGY OF THE UINTA RIVER, BRUSH CREEK AREA, DUCHESNE AND UINTAH COUNTIES, UTAH. U.S. GEOL. SURVEY BULL. 1007, 1955, 185 PP., PLATES.

KINNEY, D. M. GEOLOGY OF THE UINTA RIVER AND BRUSH CREEK-DIAMOND MOUNTAIN AREAS, DUCHESNE AND UINTAH COUNTIES UTAH. U.S. GEOL. SURVEY OIL AND GAS INV. MAP OM-123, 1957.

KINNEY, D. M., AND J. F. ROMINGER. PRETERTIARYIARY GEOLOGY OF THE WHITEROCKS RIVER - ASHLEY CREEK AREA, UINTAH COUNTY, UTAH. U.S. GEOL. SURVEY OIL AND GAS INV. PRELIM. MAP PM-82, 1947(?).

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, PP. 1-47, 1959, 3 PLATES.

PRUITT, R. G., JR. PHOSPHATE. IN MINERAL RESOURCES OF UINTAH COUNTY, UTAH GEOL. AND MINERALOG. SURVEY BULL. 71, 1961, PP. 74-87.

RULE, A. R., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1979, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SCHELL, E. M., AND J. R. DYNI. PRELIMINARY GEOLOGIC STRIP MAPS OF THE PARK CITY AND PHOSPHORIA FORMATIONS, VERNAL PHOSPHATE AREA, UINTAH COUNTY, UTAH. U.S. GEOL. SURVEY OPEN FILE REPT. 73-248, 1973, 8 SHEETS.

SCHULTZ, A. R. A GEOLOGIC RECONNAISSANCE OF THE UINTA MOUNTAINS, NORTHERN UTAH, WITH SPECIAL REFERENCE TO PHOSPHATE. IN CONTRIBUTIONS TO ECON. GEOL., 1918, PART I, U.S. GEOL. SURVEY BULL. 690, 1919, PP. 31-94, PLATE.

SMITH, L. E., E. G. HOSFORD, R. S. SEARS, D. P. SPROUSE, AND M. D. STEWART. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN UTAH, 1947-48. U.S. GEOL. SURVEY CIRC. 211, 1952, 48 PP.

UNTERMANN, G. E., B. R. UNTERMANN, AND D. M. KINNEY. GEOLOGY OF UINTAH COUNTY. UTAH GEOL. AND MINERALOG. SURVEY BULL. 72, 1964, 2 PLATES.

U.S. GEOLOGICAL SURVEY. VERNAL, UTAH; COLORADO, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1954, 1 SHEET.

SCHUMACHER, O. L., R. A. PENSE, AND R. B. DAVIS. FEDERAL LAND STATUS IN THE OVERTHRUST BELT OF IDAHO, MONTANA, UTAH, AND WYOMING, 1979. BUMINES SPECIAL REPT. (IN PRESS), TEXT WITH MAPS AND OVERLAYS, 1979.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF UTAH LAND OWNERSHIP AND PUBLIC MANAGEMENT, BASIN - H. U.S. BUR. LAND MANAGEMENT MAP, 1:250,000 SCALE, 1973, 1 SHEET.

WILLIAMS, J. S. PHOSPHATE IN UTAH. UTAH AGR. EXPT. STA. BULL. 290, 1939, 44 PP.

WILLIAMS, J. S. THE PERMIAN SYSTEM IN THE UINTA MOUNTAIN AREA. IN INTERMOUNTAIN ASSOC. OF GEOL. 16TH ANN. FIELD CONF. GUIDEBOOK, 1969, PP. 153-166.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SOUTHERN WASATCH RANGE
SEQUENCE NUMBER: 0490490073

NATION: USA STATE: UTAH
COUNTY: UTAH
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: PAST PRODUCER
LATITUDE: N 40 DEG 10 MIN 00 SEC
LONGITUDE: W 111 DEG 26 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4446135 EASTING: 463099
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 1830 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
FEDERAL LEASE; FEE OWNERSHIP

ALTERNATE NAMES
LITTLE DIAMOND CREEK

OWNERSHIP	STATUS
UNIDENTIFIED OWNER	OWNER
U.S. GOVERNMENT	OWNER
VARIOUS PRIVATE OWNERS	UNKNOWN

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
UNDIFFERENTIATED	1,200,000	4,500,000	4,500,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1939	1967	1967

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	25.2	WT-PCT
	H2O	0	WT-PCT
2	P2O5	18.0	WT-PCT
	H2O	0	WT-PCT
3	P2O5	24.0	WT-PCT
	H2O	0	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: RESOURCES TO DEPTH OF 2500 FEET.
RECORDS 2 AND 3: CONSISTS OF RESOURCES WITHIN 2500 FEET OF VERTICAL DEPTH AND OVER 1300 FEET OF OUTCROP IN THE VICINITY OF LITTLE DIAMOND CREEK. GIVEN GRADES ARE CUTOFF GRADES.

SOURCE FOR RECORD 1:
WILLIAMS, J. S. PHOSPHATE IN UTAH. UTAH AGR. EXPT. STA. BULL. 290, 1939, 44 PP.

SOURCE FOR RECORDS 2 AND 3:
COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

------EXPLORATION METHODS-------
GEOLOGICAL

YEAR OF INITIAL PRODUCTION: 1941
YEAR OF FINAL PRODUCTION: 1953

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PARK CITY FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	NEAR ORE
CHERT	NEAR ORE
SANDSTONE	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

BAKER, A. A. STRATIGRAPHY OF THE WASATCH MOUNTAINS IN THE VICINITY OF PROVO, UTAH. U.S. GEOL. SURVEY PRELIM. CHART OC-30, 1947.

BAKER, A. A. GEOLOGIC MAP OF THE WEST HALF OF THE STRAWBERRY VALLEY QUADRANGLE, UTAH. U.S. GEOL. SURVEY MISC. INV. SER. MAP I-931, 1976.

BAKER, E. T., JR. GEOLOGIC MAP OF THE NORTHEAST PART OF SPANISH FORK PEAK QUADRANGLE, UTAH. U.S. GEOL. SURVEY OPEN FILE REPT. 72-9, 1972.

BISSELL, H. J. NORTH STRAWBERRY VALLEY SEDIMENTATION AND TECTONICS. IN INTERMOUNTAIN ASSOC. OF PETROLEUM GEOL. 10TH ANNUAL FIELD CONF., 1959, PP. 159-165.

CHENEY, T. M. PHOSPHATE IN UTAH. UTAH GEOL. AND MINERALOG. SURVEY BULL. 59, 1957, 54 PP., 3 PLATES.

CHENEY, T. M., R. A. SMART, R. G. WARING, AND M. A. WARNER. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN UTAH, 1949-51. U.S. GEOL. SURVEY CIRC. 306, 1953, 40 PP.

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1946, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 08699-011 - DAMES AND MOORE), 1978, 86 PP.

DE VOTO, R. H., AND D. N. STEVENS, EDS. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT EO-84-9903 (DENDI FIELD ENG. CONF.) BY EARTH SCIENCES INC., 1979, 1396 PP. PLUS PLATES.

DUNCAN, A. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, PP. 275-283.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GERE, W. C. PHOSPHATE IN MINERAL AND WATER RESOURCES OF UTAH. UTAH GEOL. AND MINERALOG. SURVEY BULL. 73, 1964, PP. 195-205.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HARRIS, R. A., D. F. DAVIDSON, AND R. P. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

NEIGHBOR, F. GEOLOGY OF THE DIAMOND FORK ANTICLINE. IN INTERMOUNTAIN ASSOC. OF PETROLEUM GEOL. 10TH ANN. FIELD CONF., 1959, PP. 178-181.

RULE, A. R., C. C. DAHLIN, AND A. J. FERCUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1979, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SCHULTZ, A. R. A GEOLOGIC RECONNAISSANCE OF THE UINTA MOUNTAINS, NORTHERN UTAH, WITH SPECIAL REFERENCE TO PHOSPHATE. IN CONTRIBUTIONS TO ECON. GEOL., 1918, PART I: U.S. GEOL. SURVEY BULL. 690, 1919, PP. 31-94, PLATE.

SCHUMACHER, O. L., R. A. PENSE, AND R. B. DAVIS. FEDERAL LAND STATUS IN THE OVERTHRUST BELT OF IDAHO, MONTANA, UTAH, AND WYOMING, 1979. BUMINES SPECIAL REPT. (IN PRESS), TEXT WITH MAPS AND OVERLAYS, 1979.

SMITH, L. E., E. G. HOSFORD, R. S. SEARS, D. F. SPROUSE, AND M. D. STEWART. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN UTAH, 1947-48. U.S. GEOL. SURVEY CIRC. 211, 1952, 48 PP.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF UTAH LAND OWNERSHIP AND PUBLIC MANAGEMENT, WASATCH - F. U.S. BUR. LAND MANAGEMENT MAP, 1:250,000 SCALE, 1973, 1 SHEET.

U.S. GEOLOGICAL SURVEY. SALT LAKE CITY, UTAH; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY 1:250,000-SCALE MAP, 1954, 1 SHEET.

U.S. GEOLOGICAL SURVEY. PRICE, UTAH, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1962, 1 SHEET.

WILLIAMS, J. S. PHOSPHATE IN UTAH. UTAH AGR. EXPT. STA. BULL. 290, 1939, 44 PP.

WYOMING

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SOUTHEAST WIND RIVER RANGE SEQUENCE NUMBER: 0560130879

NATION: USA STATE: WYOMING COUNTY: FREMONT
TYPE OF OPERATION: PROSPECT CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 42 DEG 40 MIN 00 SEC LONGITUDE: W 108 DEG 45 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN NORTHING: 4726039 EASTING: 684391
POINT OF REFERENCE: ORE BODY PRECISION: 10 KILOMETERS
ELEVATION: 2680 METERS PRECISION: 100 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
  FEE OWNERSHIP; MINERALS ONLY;
  FEDERAL LEASE; STATE LEASE

ALTERNATE NAMES
  BALDWIN CREEK - CHERRY CREEK
  RED CANYON
  TWIN CREEK - TWEED CREEK
  TWEED CREEK-BEAVER CREEK
  SWEETWATER RIVER

OWNERSHIP	STATUS
U.S. GOVERNMENT	OWNER
STATE OF WYOMING	OWNER
WIND RIVER INDIAN RESERVATION	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
INFERRED	54,600,000	236,300,000	129,700,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1963	1963	1963

	RECORD 4	RECORD 5	RECORD 6
UNDIFFERENTIATED	54,900,000	14,500,000	20,200,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1947	1947	1967

	RECORD 7	RECORD 8	RECORD 9
UNDIFFERENTIATED	18,400,000	13,900,000	22,700,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1967	1967	1967

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	18.0	WT-PCT
	H20	0	WT-PCT
2	P205	18.0	WT-PCT
	H20	0	WT-PCT
3	P205	18.0	WT-PCT
	H20	0	WT-PCT
4	P205	18.0	WT-PCT
	H20	0	WT-PCT
5	P205	24.0	WT-PCT
	H20	0	WT-PCT
6	P205	18.0	WT-PCT
	H20	0	WT-PCT
7	P205	18.0	WT-PCT
	H20	0	WT-PCT
8	P205	18.0	WT-PCT
	H20	0	WT-PCT
9	P205	18.0	WT-PCT
	H20	0	WT-PCT

RESERVE-RESOURCE - REMARKS

ALL RECORDS: GIVEN GRADES ARE CUTOFF GRADES.

RECORD 1: CONTAINS ABOVE ENTRY LEVEL RESOURCES IN THE MIDDLE POPO AGIE RIVER AND BALDWIN CREEK AREAS.

RECORD 2: CONTAINS ABOVE ENTRY LEVEL RESOURCES IN THE WILLOW CREEK AREA PLUS ADJACENT AREA NORTH OF CHERRY CREEK.

RECORD 3: INCLUDES ABOVE ENTRY LEVEL RESOURCES IN THE DEEP CREEK, TWEED CREEK, AND BEAVER CREEK AREAS, PLUS THE SOUTHERN TWO-THIRDS OF THE CHERRY CREEK AREA.

RECORDS 4 AND 5: CONSIST OF ABOVE ENTRY LEVEL RESOURCES IN THE AREA FROM CHERRY CREEK TO BALDWIN CREEK (INCLUDES THE MIDDLE POPO AGIE RIVER AND WILLOW CREEK AREAS).

RECORD 6: CONTAINS ABOVE ENTRY LEVEL RESOURCES IN THE MACFIE BLOCK AREA BETWEEN CHERRY CREEK AND LITTLE POPO AGIE RIVER.

RECORD 7: CONTAINS ABOVE ENTRY LEVEL RESOURCES BETWEEN TWIN CREEK AND TWEED CREEK.

RECORD 8: CONSISTS OF ABOVE DRAINAGE LEVEL RESOURCES BETWEEN TWEED CREEK AND BEAVER CREEK.

RECORD 9: CONSISTS OF ABOVE DRAINAGE LEVEL RESOURCES IN THE SWEETWATER RIVER AREA.

SOURCE FOR RECORDS 1, 2, AND 3:
SHELDON, R. P. STRATIGRAPHY AND MINERAL RESOURCES OF PERMIAN ROCKS IN WESTERN WYOMING. U.S. GEOL. SURVEY PROF. PAPER 313-B, 1963, PP. 49-273, PLATES.

SOURCE FOR RECORDS 4 AND 5:
KING, R. H. PHOSPHATE DEPOSITS NEAR LANDER, WYOMING. GEOL. SURVEY OF WYO. BULL. 39, 1947, 84 PP., 3 PLATES.

SOURCE FOR RECORDS 6, 7, 8, AND 9:
COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

-------EXPLORATION METHODS-------
GEOLOGICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PARK CITY FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	NEAR ORE
CHERT	NEAR ORE
SANDSTONE	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

BAYLEY, R. W. GEOLOGIC MAP OF THE MINERS DELIGHT QUADRANGLE, FREMONT COUNTY, WYOMING. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-460, 1965.

BLACKWELDER, E. A RECONNAISSANCE OF THE PHOSPHATE DEPOSITS OF WESTERN WYOMING. IN U.S. GEOL. SURVEY BULL. 470, 1911, PP. 452-483.

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1946, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

CONDIT, D. D. PHOSPHATE DEPOSITS IN THE WIND RIVER MOUNTAINS, NEAR LANDER, WYOMING. U.S. GEOL. SURVEY BULL. 764, 1924, 39 PP.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 08699-011 - DAMES AND MOORE), 1978, 86 PP.

DE VOTO, R. H., AND D. N. STEVENS, ED. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT 50-54-5903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 1396 PP. PLUS PLATES.

DUNCAN, W. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, PP. 275-283.

CARRARD CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1100 PP.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-109.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 267 PP., 3 PLATES.

HARRIS, R. A., D. F. DAVIDSON, AND R. P. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

KING, P. P. PHOSPHATE DEPOSITS NEAR LANDER, WYOMING. GEOL. SURVEY OF WYO. BULL. 39, 1947, 84 PP., 3 PLATES.

KING, P. B. STRATIGRAPHY OF THE PHOSPHORIA FORMATION IN THE WIND RIVER MOUNTAINS. IN WYO. GEOL. ASSOC. GUIDEBOOK, 12TH ANN. FIELD CONF., 1957, PP. 35-38.

KING, W. E., AND J. L. SCHUMAKER. INVESTIGATION OF THE LANDER PHOSPHATE ROCK DEPOSITS, FREMONT COUNTY, WYOMING. BUMINES RI 4437, 1949, 12 PP.

LAKE, D.W. THE PHOSPHORIA AND GOOSE EGG FORMATIONS IN WYOMING. GEOL. SURVEY OF WYO., PRELIM. REPT. 12, 1973, 24 PP.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 2 PLATES.

SHELDON, R. P. PHYSICAL STRATIGRAPHY AND MINERAL RESOURCES OF PERMIAN ROCKS IN WESTERN WYOMING. U.S. GEOL. SURVEY PROF. PAPER 313-B, 1963, PP. 49-273, PLATES.

SHELDON, R. P., P. G. WARING, M. A. WARNER, AND P. A. SMART. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING, 1949-50. U.S. GEOL. SURVEY CIRC. 307, 1953, 45 PP.

SUMNER, W. L. GEOLOGIC MAP OF THE PHOSPHATE RESERVE IN THE LANDER AREA, FREMONT COUNTY, WYOMING. U.S. GEOL. SURVEY MIN. INV. FIELD STUDIES MAP MF-305, 1973, 1 SHEET PLUS 4 PP. TEXT.

RULE, A. R., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1978, 1978, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF WYOMING LAND STATUS. U.S. BUR. OF LAND MANAGEMENT MAP, 1:500,000 SCALE, 1978, 1 SHEET.

U.S. GEOLOGICAL SURVEY. MINERAL AND WATER RESOURCES OF WYOMING. U.S. CONGRESS - SENATE DOC. 76, 1960, PP. 14-16, 145-147.

U.S. GEOLOGICAL SURVEY. LANDER, WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1961, 1 SHEET.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SNAKE RIVER RANGE

SEQUENCE NUMBER: 0560230029

NATION: USA STATE: WYOMING
TYPE OF OPERATION: PROSPECT
LATITUDE: N 43 DEG 27 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 2440 METERS
DATUM: SEA LEVEL

COUNTY: LINCOLN
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 110 DEG 58 MIN 00 SEC
NORTHING: 4810573 EASTING: 502697
PRECISION: 10 KILOMETERS
PRECISION: 100 METERS
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
BIG HOLE MOUNTAINS
SOUTHERN SNAKE RIVER RANGE
NORTHEASTERN SNAKE RIVER RANGE
SOUTHERN TETON RANGE
NORTHWESTERN SNAKE RIVER RANGE

OWNERSHIP
U.S. GOVERNMENT

STATUS
OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
INFERRED	312,800,000	------	------
UNDIFFERENTIATED	------	3,900,000	70,800,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1963	1972	1972

	RECORD 4	RECORD 5	RECORD 6
INFERRED	37,400,000	------	6,900,000
UNDIFFERENTIATED	------	15,100,000	------
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1963	1973	1963

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	18.0	WT-PCT
	H20	0	WT-PCT
2	P205	18.0	WT-PCT
	H20	0	WT-PCT
3	P205	18.0	WT-PCT
	H20	0	WT-PCT
4	P205	24.0	WT-PCT
	H20	0	WT-PCT
5	P205	24.0	WT-PCT
	H20	0	WT-PCT
6	P205	31.0	WT-PCT
	H20	0	WT-PCT

RESERVE-RESOURCE - REMARKS

ALL RECORDS: GIVEN GRADES ARE CUTOFF GRADES.

RECORD 1: INCLUDES RESOURCES IN THE IDAHO PORTION OF THE TETON RANGE, AND ON THE IDAHO SIDE OF THE NORTHWEST TREND SOUTH OF TETON PASS; EXCLUDES RESOURCES IN THE WYOMING PORTION OF ONE IDAHO-WYOMING BLOCK IN THE NORTHWEST SNAKE RIVER RANGE.

RECORDS 2 AND 5: CONSIST OF RESOURCES IN THE RENDEZVOUS PEAK QUADRANGLE ONLY.

RECORD 3: CONSISTS OF RESOURCES IN THE FERRY PEAK QUADRANGLE ONLY.

RECORD 4: INCLUDES RESOURCES IN THE IDAHO PORTION OF THE TETON RANGE, AND ON THE IDAHO SIDE OF THE NORTHWEST TREND SOUTH OF TETON PASS.

RECORD 6: INCLUDES RESOURCES IN THE IDAHO PORTION OF THE TETON RANGE.

SOURCE FOR RECORDS 1, 4, AND 6:
SHELDON, R. P. PHYSICAL STRATIGRAPHY AND MINERAL RESOURCES OF PERMAIAN ROCKS IN WESTERN WYOMING. U.S. GEOL. SURVEY PROF. PAPER 313-B, 1963, PP.49-273, PLATES.

SOURCE FOR RECORDS 2 AND 5:
SCHROEDER, M. L. GEOLOGIC MAP OF RENDEZVOUS PEAK QUADRANGLE, TETON COUNTY, WYOMING. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-980, 1972, 1973.

SOURCE FOR RECORD 3:
JOBIN, D. A. GEOLOGIC MAP OF THE FERRY PEAK QUADRANGLE, LINCOLN COUNTY, WYOMING. U.S. GEOL. SUVEY GEOL. QUADRANGLE MAP GQ-1027, 1972.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

-------EXPLORATION METHODS-------
GEOLOGICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	NEAR ORE
CHERT	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

ALBEE, H. F. GEOLOGIC MAP OF THE OBSERVATION PEAK QUADRANGLE, TETON AND LINCOLN COUNTIES, WYOMING. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-1081, 1973.

ALBEE, H. F., AND H. L. CULLINS. GEOLOGIC MAP OF THE ALPINE QUADRANGLE, BONNEVILLE COUNTY, IDAHO, AND LINCOLN COUNTY, WYOMING. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-1259, 1975.

CHENEY, T. M., R. P. SHELDON, R. G. WARING, AND M. A. WARNER. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING, 1951. U.S. GEOL. SURVEY CIRC. 324, 1954, 22 PP.

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1946, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 08699-011 - DAMES AND MOORE), 1978, 86 PP.

DE VOTO, R. H., AND D. N. STEVENS, ED. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT 50-54-5903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 1396 PP. PLUS PLATES.

DUNCAN, W. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, PP. 275-283.

GARDNER, L. S., AND A. L. ANDERSON. PHOSPHATE DEPOSITS OF THE TETON BASIN AREA, IDAHO AND WYOMING. U.S. GEOL. SURVEY BULL. 944-A, 1944, PP. 1-36, 22 PLATES.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HARRIS, R. A., D. F. DAVIDSON, AND P. P. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

HOREERS, L., V. NELSON, AND V. CHURCH. STRUCTURAL TRENDS IN CENTRAL WESTERN WYOMING. GEOL. SOC. OF AMERICA BULL., V. 60, 1949, PP. 183-216.

JOSIN, D. A. GEOLOGIC MAP OF THE FERRY PEAK QUADRANGLE, LINCOLN COUNTY, WYOMING. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-1027, 1972.

LANE, E. W. THE PHOSPHORIA AND GOOSE EGG FORMATIONS IN WYOMING. GEOL. SURVEY OF WYO., PRELIM. REPT. 12, 1973, 24 PP.

LINES, G. C., AND W. R. GLASS. WATER RESOURCES OF THE THRUST BELT OF WESTERN WYOMING. U.S. GEOL. SURVEY HYDROL. INV. ATLAS MAP HA-539, 1975.

LOVE, J. D. GEOLOGIC MAP OF THE GROS VENTRE JUNCTION QUADRANGLE, TETON COUNTY, WYOMING. U.S. GEOL. SURVEY OPEN FILE REPT. 75-334, 1975, 1 SHEET.

LOVE, J. D. GEOLOGIC MAP OF THE TETON VILLAGE QUADRANGLE, TETON COUNTY, WYOMING. U.S. GEOL. SURVEY OPEN FILE MAP 75-335, 1975, 1 SHEET.

LOVE, J. D., J. C. REED, JR., R. L. CHRISTIANSEN, AND J. R. STACY. GEOLOGIC BLOCK DIAGRAM AND TECTONIC HISTORY OF THE TETON REGION, WYOMING - IDAHO. U.S. GEOL. SURVEY MISC. INV. MAP I-730, 1972.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

RAMPTON, E. H., M. L. SCHROEDER, E. M. SCHELL, AND F. R. CRESSMAN. GEOLOGIC MAP OF THE DRIGGS QUADRANGLE, BONNEVILLE AND TETON COUNTIES, IDAHO, AND TETON COUNTY, WYOMING. U.S. GEOL. SURVEY MIN. INV. FIELD STUDIES MAP MF-300, 1967.

RULE, A. R., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1978, 1978, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., L. E. KIREY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SCHROEDER, M. L. GEOLOGIC MAP OF THE TETON PASS QUADRANGLE, TETON COUNTY, WYOMING. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-793, 1969.

SCHROEDER, M. L. GEOLOGIC MAP OF THE RENDEZVOUS PEAK QUADRANGLE, TETON COUNTY, WYOMING. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-980, 1972, 1973.

SCHULTZ, A. R. A GEOLOGIC RECONNAISSANCE FOR PHOSPHATE AND COAL IN SOUTHEASTERN IDAHO AND WESTERN WYOMING. U.S. GEOL. SURVEY BULL. 680, 1918, 84 PP.

SHELDON, R. P. STRATIGRAPHY OF THE PHOSPHORIA FORMATION IN THE JACKSON HOLE REGION, WYOMING. IN WYOMING GEOL. ASSOC. 11TH ANN. FIELD CONF. (JACKSON HOLE), 1956, PP. 66-69.

SHELDON, R. P. PHYSICAL STRATIGRAPHY OF THE PHOSPHORIA FORMATION IN NORTHWESTERN WYOMING. U.S. GEOL. SURVEY BULL. 1042-E, 1957, PP. 105-185, PLATES.

SHELDON, R. P. PHYSICAL STRATIGRAPHY AND MINERAL RESOURCES OF PERMAIAN ROCKS IN WESTERN WYOMING. U.S. GEOL. SURVEY PROF. PAPER 313-B, 1963, PP.49-273, PLATES.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF WYOMING LAND STATUS. U.S. BUR. OF LAND MANAGEMENT MAP, 1:500,000 SCALE, 1978, 1 SHEET.

U.S. GEOLOGICAL SURVEY. DRIGGS, IDAHO; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL SURVEY, 1:250,000-SCALE MAP, 1955, 1 SHEET.

U.S. GEOLOGICAL SURVEY. MINERAL AND WATER RESOURCES OF WYOMING. U.S. CONGRESS - SENATE DOC. 76, 1960, PP. 14-16, 145-147.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SALT RIVER RANGE
SEQUENCE NUMBER: 0560230030

NATION: USA STATE: WYOMING
COUNTY: LINCOLN
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 42 DEG 43 MIN 00 SEC
LONGITUDE: W 110 DEG 49 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4729153 EASTING: 515012
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 2740 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
LOCATED CLAIMS; FEE OWNERSHIP

ALTERNATE NAMES
STRAWBERRY CREEK - WILLOW CREEK
SWIFT CREEK - COTTONWOOD CREEK
SOUTHERN SALT RIVER RANGE

OWNERSHIP	STATUS
U.S. GOVERNMENT	OWNER
AMERICAN NUCLEAR CORPORATION	UNKNOWN

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
UNDIFFERENTIATED	353,900,000	273,500,000	10,900,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1967	1967	1967

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	18.0	WT-PCT
	H20	3	WT-PCT
2	P205	24.0	WT-PCT
	H20	0	WT-PCT
3	P205	31.0	WT-PCT
	H20	0	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORDS 1, 2, AND 3: GIVEN GRADES ARE CUTOFF GRADES.

SOURCE FOR RECORDS 1, 2, AND 3:
COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 152 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

-------EXPLORATION METHODS-------
GEOLOGICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	NEAR ORE
CHERT	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1944, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 04699-011 - DAMES AND MOORE), 1978, 86 PP.

DE VOTO, R. H., AND D. N. STEVENS, ED. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT EO-54-3903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 1396 PP. PLUS PLATES.

DUNCAN, R. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1967, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, 1970, PP. 275-283.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HARRIS, R. A., C. F. DAVIDSON, AND R. F. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

LINES, G. C., AND W. R. GLASS. WATER RESOURCES OF THE DEPOSITS OF WESTERN WYOMING. IN U.S. GEOL. SURVEY BULL. HYDROL. INV. ATLAS MAP HA-539, 1975.

MANSFIELD, G. R. A RECONNAISSANCE FOR PHOSPHATE IN THE SALT RIVER RANGE, WYOMING. IN CONTRIBUTIONS TO ECON. GEOL., 1915, PART I. U.S. GEOL. SURVEY BULL. 620, 1916, PP. 331-349.

MANSFIELD, G. R. GEOGRAPHY, GEOLOGY, AND MINERAL RESOURCES OF PART OF SOUTHEASTERN IDAHO. U.S. GEOL. SURVEY PROF. PAPER 152, 1927, 453 PP., 12 PLATES.

MCKELVEY, V. E. PRELIMINARY REPORT ON STRATIGRAPHY OF THE PHOSPHATIC SHALE MEMBER OF PHOSPHORIA FORMATION IN WESTERN WYOMING, SOUTHEASTERN IDAHO, AND NORTHERN UTAH. U.S. GEOL. SURVEY UNPUB. REPT., 1946, 162 PP. OBTAINED FROM U.S. GEOL. SURVEY, CONSERV. DIV. OFFICE IN ROCK SPRINGS, WYO.

RUBEY, W. W. GEOLOGY OF THE BEDFORD QUADRANGLE, WYOMING. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-109, 1958.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

MCKELVEY, V. E., R. W. SWANSON, AND R. P. SHELDON. PHOSPHORIA FORMATION IN SOUTHEASTERN IDAHO AND WESTERN WYOMING. IN INTERMOUNTAIN ASSOC. OF PETROLEUM GEOL. GUIDEBOOK, 4TH ANN. FIELD CONF., 1953, PP. 41-47.

RUBEY, W. W. GEOLOGIC MAP OF THE AFTON QUADRANGLE AND PART OF THE BIG PINEY QUADRANGLE, LINCOLN SUBLETTE COUNTIES, WYOMING. U.S. GEOL. SURVEY MISC. INV. MAP I-686, 1973.

RULE, A. R., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1979, 1978, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SCHULTZ, A. R. A GEOLOGIC RECOINNAISSANCE FOR PHOSPHATE AND COAL IN SOUTHEASTERN IDAHO AND WESTERN WYOMING. U.S. GEOL. SURVEY BULL. 680, 1918, 84 PP.

SHELDON, R. P. PHYSICAL STRATIGRAPHY OF THE PHOSPHORIA FORMATION IN NORTHWESTERN WYOMING. U.S. GEOL. SURVEY BULL. 1042-E, 1957, PP. 105-185, PLATES.

SHELDON, R. P., R. G. WARING, M. A. WARNER, AND R. A. SMART. STRATIGRAPHIC SECTIONS OF THE PHOSPHIA FORMATION IN WYOMING, 1949-50. U.S. GEOL. SURVEY CIRC. 307, 1953, 45 PP.

SWANSON, R. W., V. E. MCKELVEY, AND R. P. SHELDON. PROGRESS REPORT ON INVESTIGATIONS OF WESTERN PHOSPHATE DEPOSITS. U.S. GEOL. SURVEY CIRC. 297, 1953, 16 PP.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF WYOMING LAND STATUS. U.S. BUR. OF LAND MANAGEMENT MAP, 1:500,000-SCALE, 1978, 1 SHEET.

U.S. GEOLOGICAL SURVEY. PRESTON, IDAHO; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY 1:250,000-SCALE MAP, 1955, 1 SHEET.

U.S. GEOLOGICAL SURVEY. DRIGGS, IDAHO; WYOMING 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1955, 1 SHEET.

U.S. GEOLOGICAL SURVEY. MINERAL AND WATER RESOURCES OF WYOMING. U.S. CONGRESS - SENATE DOC. 76, 1960, PP. 14-15, 145-147.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: WYOMING RANGE
SEQUENCE NUMBER: 0560230032

NATION: USA STATE: WYOMING
COUNTY: LINCOLN
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 42 DEG 44 MIN 00 SEC
LONGITUDE: W 110 DEG 36 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4731065 EASTING: 532744
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 3050 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP	STATUS
U.S. GOVERNMENT	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U308 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3	RECORD 4
INFERRED	201,700,000	399,500,000	------	------
UNDIFFERENTIATED	------	------	452,700,000	144,200,000
UNITS	MT ORE	MT ORE	MT ORE	MT ORE
YEAR/DATA	1954	1954	1967	1967

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	18.0	WT-PCT
	H20	0	WT-PCT
2	P205	24.0	WT-PCT
	H20	0	WT-PCT
3	P205	18.0	WT-PCT
	H20	0	WT-PCT
4	P205	24.0	WT-PCT
	H20	0	WT-PCT

RESERVE-RESOURCE - REMARKS

ALL RECORDS: GIVEN GRADES ARE CUTOFF GRADES.

SOURCE FOR RECORDS 1 AND 2:
SHELDON, R. P., E. R. CRESSMAN, L. D. CARSWELL, AND R. A. SMART. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING, 1952.
U.S. GEOL. SURVEY CIRC. 325, 1954, 24 PP.

SOURCE FOR RECORDS 3 AND 4:
COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

-------EXPLORATION METHODS-------
GEOLOGICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	NEAR ORE
CHERT	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1946, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 08699-011 - DAMES AND MOORE), 1978, 86 PP.

DE VOTO, R. H., AND D. N. STEVENS, ED. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT 50-54-5903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 1396 PP. PLUS PLATES.

DUNCAN, W. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, PP. 275-283.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GEOLOGICAL SURVEY OF WYOMING. THE WYOMING MINERAL INDUSTRY. GEOL. SURVEY OF WYO. PUBLIC INF. CIRC. 8., 1978.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HARRIS, R. A., D. F. DAVIDSON, AND B. P. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

HORBERG, L., V. NELSON, AND V. CHURCH. STRUCTURAL TRENDS IN CENTRAL WESTERN WYOMING. GEOL. SOC. OF AMERICA BULL., V. 60, 1949, PP. 183-216.

KING, D. L. SURFACE STRIP PHOSPHATE MINING AT LEEFE, WYOMING, AND MONTPELIER, IDAHO. IN SYMP. ON WESTERN PHOSPHATE MINING, SAN FRANCISCO, CALIF., FEBRUARY, 1949; REPR. IN AIME MIN. TRANS., V. 184, 1949, PP. 284-287.

LINES, G. C., AND W. R. GLASS. WATER RESOURCES OF THE THRUST BELT OF WESTERN WYOMING. U.S. GEOL. SURVEY HYDROL. INV. ATLAS MAP HA-539, 1975.

MCKELVEY, V. E. PRELIMINARY REPORT ON STRATIGRAPHY OF THE PHOSPHATIC SHALE MEMBER OF THE PHOSPHORIA FORMATION IN WESTERN WYOMING, SOUTHEASTERN IDAHO, AND NORTHERN UTAH. U.S. GEOL. SURVEY UNPUB. REPT., 1946, 162 PP. OBTAINED FROM U.S. GEOL. SURVEY CONSERV. DIV. OFFICE IN ROCK SPRINGS, WYO.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

RULE, A. R., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1978, 1978, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SHELDON, R. P., E. R. CRESSMAN, L. D. CARSWELL, AND R. A. SMART. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING, 1952. U.S. GEOL. SURVEY CIRC. 325, 1954, 24 PP.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF WYOMING LAND STATUS. U.S. BUR. OF LAND MANAGEMENT MAP, 1:500,000-SCALE, 1978, 1 SHEET.

U.S. GEOLOGICAL SURVEY. PRESTON, IDAHO; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1955, 1-SHEET.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: TUMP RANGE
SEQUENCE NUMBER: 0560230034

NATION: USA STATE: WYOMING
COUNTY: LINCOLN
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 42 DEG 06 MIN 00 SEC
LONGITUDE: W 110 DEG 49 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4660681 EASTING: 515159
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 2560 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
FEE OWNERSHIP; MINERALS ONLY

ALTERNATE NAMES
TUMP RANGE

OWNERSHIP	STATUS
U.S. GOVERNMENT	OWNER
STATE OF WYOMING	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
UNDIFFERENTIATED	10,900,000	8,300,000	2,400,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1967	1967	1967

	RECORD 4	RECORD 5	RECORD 6
UNDIFFERENTIATED	32,800,000	21,800,000	9,300,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1967	1967	1967

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	18.0	WT-PCT
	H2O	0	WT-PCT
2	P2O5	24.0	WT-PCT
	H2O	0	WT-PCT
3	P2O5	31.0	WT-PCT
	H2O	0	WT-PCT
4	P2O5	18.0	WT-PCT
	H2O	0	WT-PCT
5	P2O5	24.0	WT-PCT
	H2O	0	WT-PCT
6	P2O5	31.0	WT-PCT
	H2O	0	WT-PCT

RESERVE-RESOURCE - REMARKS

ALL RECORDS: GIVEN GRADES ARE CUTOFF GRADES.

RECORDS 1, 2, AND 3: RECORDS CONSIST OF ABOVE ENTRY LEVEL RESOURCES IN THE BASIN CREEK AREA.

RECORDS 4, 5, AND 6: RECORDS CONSIST OF ABOVE ENTRY LEVEL RESOURCES IN THE PINE CREEK AND SUBLETTE CREEK DRAINAGES.

SOURCE FOR RECORDS 1, 2, 3, 4, 5, AND 6:
COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH.
BUMINES RI 6934, 1967, 158 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD: ORE-MINERAL IN PLACE

----------EXPLORATION METHODS----------
GEOLOGICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	NEAR ORE
CHERT	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1946. 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 08699-011 - DAMES AND MOORE), 1978, 86 PP.

DE VOTO, R. H., AND D. N. STEVENS, ED. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT 50-54-5903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 1396 PP. PLUS PLATES.

DUNCAN, W. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, PP. 275-283.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HARRIS, R. A., D. F. DAVIDSON, AND B. F. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

MCKELVEY, V. E. PRELIMINARY REPORT ON STRATIGRAPHY OF THE PHOSPHATIC SHALE MEMBER OF THE PHOSPHORIA FORMATION IN WESTERN WYOMING, SOUTHEASTERN IDAHO, AND NORTHERN UTAH. U.S. GEOL. SURVEY UNPUB. REPT., 1946, 162 PP. OBTAINED FROM U.S. GEOL. SURVEY DEPT. OF CONSERV. OFFICE IN ROCK SPRINGS, WYO.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

MCKELVEY, V. E., L. E. SMITH, R. A. HOPPIN, AND F. C. ARMSTRONG. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING. U.S. GEOL. SURVEY CIRC. 210, 1953, 35 PP.

RUBEY, W. W., S. S. ORIEL, AND J. I. TRACEY, JR. GEOLOGY OF THE SAGE AND KEMMERER 15-MINUTE QUADRANGLES, LINCOLN COUNTY, WYOMING. U.S. GEOL. SURVEY PROF. PAPER 855, 1975, 18 PP., 2 PLATES.

RUBEY, W. W., S. S. ORIEL, AND J. I. TRACEY, JR. GEOLOGIC MAP OF THE COKEVILLE 30-MINUTE QUADRANGLE, LINCOLN AND SUBLETTE COUNTIES, WYOMING. U.S. GEOL. SURVEY OPEN FILE REPT. 76-597, 1976, 1 PLATE.

RULE, A. R., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1978, 1978, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SHELDON, R. P., E. R. CRESSMAN, L. D. CARSWELL, AND R. A. SMART. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING, 1952. U.S. GEOL. SURVEY CIRC. 325, 1954, 24 PP.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF WYOMING LAND STATUS. U.S. BUR. OF LAND MANAGEMENT MAP, 1:500,000 SCALE, 1978, 1 SHEET.

U.S. GEOLOGICAL SURVEY. PRESTON, IDAHO; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1955, 1 SHEET.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: BECKWITH HILLS
SEQUENCE NUMBER: 0560230035

NATION: USA STATE: WYOMING
COUNTY: LINCOLN
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PAST PRODUCER
LATITUDE: N 41 DEG 49 MIN 00 SEC
LONGITUDE: W 111 DEG 02 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4627358 EASTING: 497230
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 1980 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
PATENTED CLAIM; FEDERAL LEASE;
FEE OWNERSHIP

ALTERNATE NAMES
LEEFE MINE

OWNERSHIP	STATUS
STAUFFER CHEMICAL COMPANY	OWNER
U.S. GOVERNMENT	OWNER
STATE OF WYOMING	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
-------EXPLORATION METHODS-------
GEOLOGICAL
YEAR OF DISCOVERY: 1905
YEAR OF INITIAL PRODUCTION: 1908
YEAR OF FINAL PRODUCTION: 1978

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	NEAR ORE
CHERT	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

EGALL, J. V., AND P. C. MERRITT. PHOSPHATE AND POTASH-MINERALS TO FEED THE WORLD. MIN. ENG., OCTOBER 1966, PP. 75-99.

COCHRAN, R. L. WYOMING PHOSPHATE INDUSTRY. IN WYO. GEOL. ASSOC. 5TH ANN. FIELD CONF. GUIDEBOOK (SW WYOMING), 1950, PP. 133-135.

GALE, H. S., AND R. W. RICHARDS. PHOSPHATES. IN U.S. GEOL. SURVEY BULL. 430, 1910, PP. 457-553.

KING, C. L. SURFACE STRIP PHOSPHATE MINING AT LEEFE, WYOMING, AND MONTPELIER, IDAHO. IN SYMPOSIUM ON WESTERN PHOSPHATE MINING, SAN FRANCISCO, CALIF., FEBRUARY 1949. REPR. IN AIME MIN. TRANS., V. 184, 1949, PP. 284-287.

KING, C. L., SR. SAN FRANCISCO CHEMICAL CO., CRAWFORD MOUNTAIN - LEEFE AREA, UTAH AND WYOMING. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 203-209.

MCKELVEY, V. E., L. F. SMITH, R. A. HOPPIN, AND F. C. ARMSTRONG. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING. U.S. GEOL. SURVEY CIRC. 213, 1953, 35 PP.

RICHARDSON, G. B. GEOLOGY AND MINERAL RESOURCES OF THE RANDOLPH QUADRANGLE, UTAH - WYOMING. U.S. GEOL. SURVEY BULL. 923, 1941, 54 PP., PLATE.

RUBEY, W. W., S. S. ORIEL, AND J. I. TRACEY, JR. GEOLOGY OF THE SAGE AND KEMMERER 15-MINUTE QUADRANGLES, LINCOLN COUNTY, WYOMING. U.S. GEOL. SURVEY PROF. PAPER 855, 1975, 18 PP., 2 PLATES.

SCHUMACHER, O. L., R. A. PENSE, AND R. B. DAVIS. FEDERAL LAND STATUS IN THE OVERTHRUST BELT OF IDAHO, MONTANA, UTAH, AND WYOMING, 1979. BUMINES SPECIAL REPT. (IN PRESS), TEXT WITH MAPS AND OVERLAYS, 1979.

THOMAS, H. D. SUMMARY OF THE PALEOZOIC STRATIGRAPHY OF THE GREEN RIVER BASIN, WYOMING. IN WYO. GEOL. ASSOC. 5TH ANN. FIELD CONF. GUIDEBOOK (SW WYO.), 1950, PP. 17-24.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF WYOMING LAND STATUS. U.S. BUR. OF LAND MANAGEMENT MAP, 1978, 1:500,000 SCALE, 1 SHEET.

U.S. GEOLOGICAL SURVEY. OGDEN, UTAH; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1954, 1:250,000-SCALE MAP, 1 SHEET.

WYOMING NATURAL RESOURCE BOARD. WYOMING PHOSPHATE. IN REVIEW AND FORECAST - WYOMING MINERAL INDUSTRIES, BOOK III (NON-FUEL MINERALS), REPT. BY CAMERON ENGINEERS, 1969, PP. 230-276.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SOUTH RIDGES
SEQUENCE NUMBER: 0560230101

NATION: USA STATE: WYOMING
COUNTY: LINCOLN
TYPE OF OPERATION: SURFACE-UNDERGROUND
CURRENT STATUS: PAST PRODUCER
LATITUDE: N 42 DEG 13 MIN 00 SEC
LONGITUDE: W 110 DEG 36 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4673696 EASTING: 533015
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 2440 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

ALTERNATE NAMES
TOP OF THE WORLD MINE
COMMISSARY RIDGE
SOUTH MOUNTAIN MINE
ABSAROKA RIDGE

OWNERSHIP	STATUS
U.S. GOVERNMENT	OWNER
STATE OF WYOMING	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
INFERRED	1,069,800,000	159,100,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1963	1963

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	18.0	WT-PCT
	H2O	0	WT-PCT
2	P2O5	24.0	WT-PCT
	H2O	0	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORDS 1 AND 2: GIVEN GRADES ARE CUTOFF GRADES.

SOURCE FOR RECORDS 1 AND 2:
SHELDON, R. P. PHYSICAL STRATIGRAPHY AND MINERAL RESOURCES OF PERMIAN ROCKS IN WESTERN WYOMING. U. S. GEOL. SURVEY PROF. PAPER 313-B, 1963, PP. 49-273, PLATES.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE

------EXPLORATION METHODS-------
GEOLOGICAL

YEAR OF DISCOVERY: 1904
YEAR OF INITIAL PRODUCTION: 1948
YEAR OF FINAL PRODUCTION: 1949

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
  NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: UPPER PERMIAN
  DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
  RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
    GEOLOGIC AGE: TERTIARY
  ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	NEAR ORE
CHERT	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

CHENEY, T. M., R. P. SHELTON, R. G. WARING, AND M. A. WARNER. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING, 1951. U.S. GEOL. SURVEY CIRC. 324, 1954, 22 PP.

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1944. 1 SHEET.

COCHRAN, K. L. WYOMING PHOSPHATE INDUSTRY. IN WYO. GEOL. ASSOC. 5TH ANN. FIELD CONF. GUIDEBOOK (SW WYOMING), 1950, PP. 133-135.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. [illegible] - DAMES AND MOORE), 1978, 56 PP.

DE VOTO, R. H., AND D. N. STEVENS, ED. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT EO-54-S003 (PENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979. 1356 PP. PLUS PLATES.

DUNCAN, W. E., AND H. C. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, PP. 275-283.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HARRIS, R. A., D. F. DAVIDSON, AND R. F. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 99 PP.

LANE, C. W. THE PHOSPHORIA AND GOOSE EGG FORMATIONS IN WYOMING. GEOL. SURVEY OF WYO., PRELIM. REPT. 12, 1973, 24 PP.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

ORIEL, S. S. PRELIMINARY GEOLOGIC MAP OF THE FORT HILL QUADRANGLE, LINCOLN COUNTY, WYOMING. U.S. GEOL. SURVEY OIL AND GAS INV. MAP OM-212, 1963.

ORIEL, S. S. GEOLOGY OF THE FORT HILL QUADRANGLE, LINCOLN COUNTY, WYOMING. U.S. GEOL. SURVEY PROF. PAPER 594-M, 1969, 38 PP.

RUBEY, W. R., S. S. ORIEL, AND J. I. TRACEY, JR. GEOLOGY OF THE SAGE AND KEMMERER 15-MINUTE QUADRANGLES, LINCOLN COUNTY, WYOMING. U.S. GEOL. SURVEY PROF. PAPER 855, 1975, 18 PP., 2 PLATES.

RUBEY, W. W., S. S. ORIEL, AND J. I. TRACEY, JR. GEOLOGIC MAP OF THE COKEVILLE 30-MINUTE QUADRANGLE, LINCOLN AND SUBLETTE COUNTIES, WYOMING. U.S. GEOL. SURVEY OPEN FILE REPT. 76-597, 1976, 1 PLATE.

RULE, A. R., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1979, 1978, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SCHULTZ, A. R. GEOLOGY AND GEOGRAPHY OF A PORTION OF LINCOLN COUNTY, WYOMING. U.S. GEOL. SURVEY BULL. 543, 1914, PP. 43-45, 131-134.

SHELDON, R. P. PHYSICAL STRATIGRAPHY AND MINERAL RESOURCES OF PERMIAN ROCKS IN WESTERN WYOMING. U.S. GEOL. SURVEY PROF. PAPER 313-B, 1963, PP. 49-273, PLATES.

SHELDON, R. P., E. R. CRESSMAN, L. D. CARSWELL, AND R. A. SMART. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING, 1952. U.S. GEOL. SURVEY CIRC. 325, 1954, 24 PP.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF WYOMING LAND STATUS. U.S. BUR. OF LAND MANAGEMENT MAP, 1:500,000-SCALE, 1978, 1 SHEET

U.S. GEOLOGICAL SURVEY. OGDEN, UTAH; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1954, 1 SHEET.

U.S. GEOLOGICAL SURVEY. PRESTON, IDAHO; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1955, 1 SHEET.

U.S. GEOLOGICAL SURVEY. MINERAL AND WATER RESOURCES OF WYOMING: U.S. CONGRESS - SENATE DOC. 76, 1960, PP. 14-16, 145-147.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SUBLETTE RANGE
SEQUENCE NUMBER: 0560230102

NATION: USA STATE: WYOMING
COUNTY: LINCOLN
TYPE OF OPERATION: SURFACE-UNDERGROUND
CURRENT STATUS: PAST PRODUCER
LATITUDE: N 42 DEG 12 MIN 00 SEC
LONGITUDE: W 110 DEG 59 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4671768 EASTING: 501576
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 2830 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
PATENTED CLAIM; FEE OWNERSHIP;
FEDERAL LEASE

ALTERNATE NAMES
COKEVILLE PHOSPHATE MINE
YORK CANYON
COAL CANYON
RAYMOND CANYON
LAYLAND CANYON
YORK CANYON MINE
COAL CANYON MINE

OWNERSHIP	STATUS
VARIOUS UNKNOWN OWNERS	OWNER
U.S. GOVERNMENT	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
UNDIFFERENTIATED	32,500,000	5,500,000	2,400,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1910	1910	
1910			

	RECORD 4	RECORD 5
UNDIFFERENTIATED	37,800,000	24,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1967	1967

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	31.0	WT-PCT
	H20	0	WT-PCT
2	P205	31.0	WT-PCT
	H20	0	WT-PCT
3	P205	35.0	WT-PCT
	H20	0	WT-PCT
4	P205	18.0	WT-PCT
	H20	0	WT-PCT
5	P205	24.0	WT-PCT
	H20	0	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORDS 1, 2, 4, AND 5: GIVEN GRADE IS CUTOFF GRADE.

RECORD 1: RECORD CONTAINS TOTAL RESOURCES IN BOTH NORTHERN MAIN TREND OUTCROPS. EAST FLANK OF ANTICLINE ONLY IN THE RAYMOND CANYON-COAL CANYON OUTCROP.

RECORD 2: RECORD CONTAINS RESOURCES IN THE LAYLAND CANYON AREA.

RECORD 3: RECORD CONTAINS RESOURCES IN THE COKEVILLE BUTTE AREA.

RECORDS 4 AND 5: RECORDS CONTAIN RESOURCES FOR ALL THE SUBLETTE RANGE AREA.

SOURCE FOR RECORDS 1, 2, AND 3:
GALE, H. S., AND R. W. RICHARDS. PHOSPHATES. IN U.S. GEOL. SURVEY BULL. 430, 1910, PP. 457-553.

SOURCE FOR RECORDS 4 AND 5:
COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

-------EXPLORATION METHODS-------
GEOLOGICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	NEAR ORE
CHERT	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

CLAUGUCH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1948, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DE VOTO, R. H., AND D. N. STEVENS, ED. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT 50-54-5903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 1396 PP., PLUS PLATES.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 08699-011 - DAMES AND MOORE), 1978, 86 PP.

DUNCAN, W. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, PP. 275-283.

GALF, H. S., AND R. W. RICHARDS. PHOSPHATES. IN U.S. GEOL. SURVEY BULL. 430, 1910, PP. 457-553.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GULBRANDSEN, R. A. PETROLOGY OF THE MEADE PEAK PHOSPHATIC SHALE MEMBER OF THE PHOSPHORIA FORMATION AT COAL CANYON, WYOMING. U.S. GEOL. SURVEY BULL. 111-C, 1960, PP. 17-146, 2 PLATES.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HARRIS, R. A., D. F. DAVIDSON, AND B. P. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

MANSFIELD, G. R. GEOGRAPHY, GEOLOGY, AND MINERAL RESOURCES OF PART OF SOUTHEASTERN IDAHO. U.S. GEOL. SURVEY PROF. PAPER 152, 1927, 453 PP., 12 PLATES.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

MCKELVEY, V. E., L. E. SMITH, R. A. HOPPIN, AND F. C. ARMSTRONG. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING. U.S. GEOL. SURVEY CIRC. 210, 1953, 35 PP.

RUBEY, W. W., S. S. ORIEL, AND J. I. TRACEY, JR. GEOLOGIC MAP OF THE COKEVILLE 30-MINUTE QUADRANGLE, LINCOLN AND SUBLETTE COUNTIES, WYOMING. U.S. GEOL. SURVEY OPEN FILE REPT. 76-597, 1976, 1 PLATE.

RULE, A. R., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1979, 1978, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SHELDON, R. P., R. G. WARING, M. A. WARNER, AND R. A. SMART. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING, 1949-50. U.S. GEOL. SURVEY CIRC. 307, 1953, 45 PP.

U.S. GEOLOGICAL SURVEY. PRESTON, IDAHO; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1955, 1:250,000-SCALE MAP, 1 SHEET.

U.S. GEOLOGICAL SURVEY. MINERAL AND WATER RESOURCES OF WYOMING. U.S. CONGRESS - SENATE DOC. 76, 1960, PP. 14-16, 145-147.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF WYOMING LAND STATUS. U.S. BUR. OF LAND MANAGEMENT MAP, 1978, 1:500,000 SCALE, 1 SHEET.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: GROS VENTRE RANGE
SEQUENCE NUMBER: 0560350030

NATION: USA STATE: WYOMING
COUNTY: SUBLETTE
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 43 DEG 25 MIN 00 SEC
LONGITUDE: W 110 DEG 15 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4807144 EASTING: 560718
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 3050 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
U.S. GOVERNMENT

STATUS
OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U308 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
INFERRED	824,700,000	302,200,000	186,600,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1963	1963	1963

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	18.0	WT-PCT
	H20	0	WT-PCT
2	P205	24.0	WT-PCT
	H20	0	WT-PCT
3	P205	31.0	WT-PCT
	H20	0	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORDS 1, 2 AND 3: GIVEN GRADES ARE CUTOFF GRADES.

SOURCE FOR ALL RECORDS:
SHELDON, R. P. PHYSICAL STRATIGRAPHY AND MINERAL RESOURCES OF PERMIAN ROCKS IN WESTERN WYOMING. U.S. GEOL. SURVEY PROF. PAPER 313-B, PP. 49-273.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

-------EXPLORATION METHODS-------
GEOLOGICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY:
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY:
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	NEAR ORE
CHERT	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

BLACKWELDER, E. A RECONNAISSANCE OF THE PHOSPHATE DEPOSITS OF WESTERN WYOMING. IN U.S. GEOL. SURVEY BULL. 470, 1911, PP. 452-483.

CHENEY, T. M., R. P. SHELDON, R. G. WARING, AND M. A. WARNER. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING, 1951. U.S. GEOL. SURVEY CIRC. 324, 1954, 22 PP.

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1946, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 08699-011 - DAMES AND MOORE), 1978, 86 PP.

DE VOTO, R. H., AND D. N. STEVENS, ED. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT 50-54-5903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 1396 PP. PLUS PLATES.

DUNCAN, W. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, 1970, PP. 275-283.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HARRIS, R. A., D. F. DAVIDSON, AND B. P. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

HORBERG, L., V. NELSON, AND V. CHURCH. STRUCTURAL TRENDS IN CENTRAL WESTERN WYOMING. GEOL. SOC. OF AMERICA BULL., V. 60, 1949, PP. 183-216.

LANE, D. W. THE PHOSPHORIA AND GOOSE EGG FORMATIONS IN WYOMING. GEOL. SURVEY OF WYO., PRELIM. REPT. 12, 1973, 24 PP.

LOVE, J. D. GEOLOGIC MAP OF THE GROS VENTRE JUNCTION QUADRANGLE, TETON COUNTY, WYOMING. U.S. GEOL. SURVEY OPEN FILE REPT. 75-334, 1975, 1 SHEET.

LOVE, J. D. GEOLOGIC MAP OF THE TETON VILLAGE QUADRANGLE, TETON COUNTY, WYOMING. U.S. GEOL. SURVEY OPEN FILE MAP 75-335, 1975, 1 SHEET.

LOVE, J. D., J. C. REED, JR., R. L. CHRISTIANSEN, AND J. R. STACEY. GEOLOGIC BLOCK DIAGRAM AND TECTONIC HISTORY OF THE TETON REGION, WYOMING - IDAHO. U.S. GEOL. SURVEY MISC. INV. MAP I-730, 1972.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

MCKELVEY, V. E., R. W. SWANSON, AND R. P. SHELDON. PHOSPHORIA FORMATION IN SOUTHEASTERN IDAHO AND WESTERN WYOMING. IN INTERMOUNTAIN ASSOC. OF PETROLEUM GEOL. GUIDEBOOK, 4TH ANN. FIELD CONF., 1953, PP. 41-47.

RICHMOND, G. M. GEOLOGY OF NORTHWEST END OF THE WIND RIVER MOUNTAINS, SUBLETTE COUNTY, WYOMING. U.S. GEOL. SURVEY OIL AND GAS INV. MAP OM-31, 1945.

RULE, A. R., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1978, 1978, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SHELDON, R. P. STRATIGRAPHY OF THE PHOSPHORIA FORMATION IN THE JACKSON HOLE REGION, WYOMING. IN WYOMING GEOL. ASSOC. 11TH ANN. FIELD CONF. (JACKSON HOLE), 1956, PP. 66-69.

SHELDON, R. P. PHYSICAL STRATIGRAPHY OF THE PHOSPHORIA FORMATION IN NORTHWESTERN WYOMING. U.S. GEOL. SURVEY BULL. 1042-E, 1957, PP. 105-185, PLATES.

SHELDON, R. P., R. G. WARING, M. A. WARNER, AND R. A. SMART. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING, 1949-50. U.S. GEOL. SURVEY CIRC. 307, 1953, 45 PP.

SHELDON, R. P. PHYSICAL STRATIGRAPHY AND MINERAL RESOURCES OF PERMIAN ROCKS IN WESTERN WYOMING. U.S. GEOL. SURVEY PROF. PAPER 313-B, 1963, PP 49-273, PLATES.

SIMONS, F. S., J. D. LOVE, W. R. KEEFER, D. S. HARWOOD, C. L. BIENIEWSKI, AND D. M. WILSON. MINERAL RESOURCES OF THE GROS VENTRE WILDERNESS STUDY AREA, TETON AND SUBLETTE COUNTIES, WYOMING (IN PRESS). U.S. GEOL. SURVEY BULL. (UNASSIGNED), 154 PP.

SWANSON, R. W., V. E. MCKELVEY, AND R. P. SHELDON. PROGRESS REPORT ON INVESTIGATIONS OF WESTERN PHOSPHATE DEPOSITS. U.S. GEOL. SURVEY CIRC. 297, 1953, 16 PP.

U.S. GEOLOGICAL SURVEY. DRIGGS, IDAHO; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1955, 1 SHEET.

U.S. GEOLOGICAL SURVEY. MINERAL AND WATER RESOURCES OF WYOMING. U.S. CONGRESS - SENATE DOC. 76, 1960, PP. 14-16, 145-147.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF WYOMING LAND STATUS. U.S. BUR. OF LAND MANAGEMENT MAP, 1:500,000 SCALE, 1978, 1 SHEET.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HOBACK RANGE
SEQUENCE NUMBER: 0560390026

NATION: USA STATE: WYOMING
COUNTY: TETON
TYPE OF OPERATION: PROSPECT
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 43 DEG 13 MIN 00 SEC
LONGITUDE: W 110 DEG 40 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 4784714 EASTING: 527074
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 2130 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1980

TYPE OF MINERAL HOLDING
FEE OWNERSHIP

OWNERSHIP
U.S. GOVERNMENT

STATUS
OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
URANIUM	U3O8 CONTENT	RECOVERABLE
WATER CONTENT	FREE WATER	

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
INFERRED	1,019,700,000	289,400,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1963	1963

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	18.0	WT-PCT
	H2O	0	WT-PCT
2	P2O5	24.0	WT-PCT
	H2O	0	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORDS 1 AND 2: GIVEN GRADES ARE CUTOFF GRADES.

SOURCE FOR RECORDS 1 AND 2:
SHELDON, R. P. PHYSICAL STRATIGRAPHY AND MINERAL RESOURCES OF PERMIAN ROCKS IN WESTERN WYOMING. U. S. GEOL. SURVEY PROFESSIONAL PAPER 313-B, 1963, PP. 49-273.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

------EXPLORATION METHODS------
GEOLOGICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

LITHOLOGY:
NAME OF FORMATION: PHOSPHORIA FORMATION GEOLOGIC AGE: UPPER PERMIAN
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING; MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	NEAR ORE
CHERT	NEAR ORE
LIMESTONE	NEAR ORE
DOLOMITE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	APHANITIC
QUARTZ	FORMS OF SIO2	APHANITIC
ILLITE	SILICATES	APHANITIC
DOLOMITE	CARBONATES	APHANITIC
CALCITE	CARBONATES	APHANITIC
LIMONITE	OXIDES (EXCLUDING SIO2)	APHANITIC
FELDSPAR	SILICATES	APHANITIC
GYPSUM	SULFATES & CHROMATES	APHANITIC
FLUORITE	HALIDES	APHANITIC
ZIRCON	SILICATES	APHANITIC
TOURMALINE	SILICATES	APHANITIC
MONTMORILLONITE	SILICATES	APHANITIC
KAOLINITE	SILICATES	APHANITIC
SPHENE	SILICATES	APHANITIC
PYRITE	SULFIDES	APHANITIC

BIBLIOGRAPHY RECORDS

ALBEE, H. F. GEOLOGIC MAP OF THE MUNGER MOUNTAIN QUADRANGLE, TETON AND LINCOLN COUNTIES, WYOMING. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-705, 1968.

CHENEY, T. M., R. P. SHELDON, R. G. WARING, AND M. A. WARNER. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING, 1951. U.S. GEOL. SURVEY CIRC. 324, 1954, 22 PP.

CLABAUGH, P. S. PERMIAN PHOSPHATE DEPOSITS OF MONTANA, IDAHO, WYOMING, AND UTAH. U.S. GEOL. SURVEY STRATEGIC MINER. INV. PRELIM. MAP 3-198, 1946, 1 SHEET.

COFFMAN, J. S., AND A. L. SERVICE. AN EVALUATION OF THE WESTERN PHOSPHATE INDUSTRY AND ITS RESOURCES - PART 4, WYOMING AND UTAH. BUMINES RI 6934, 1967, 158 PP.

DAMES AND MOORE, INC. INVENTORY AND MARKET ANALYSIS OF THE PHOSPHATE RESOURCES OF UTAH. U.S. BUR. OF LAND MANAGEMENT CONTRACT STUDY (JOB NO. 08699-C11 - DAMES AND MOORE), 1978, 86 PP.

DE VOTO, R. H., AND D. N. STEVENS, ED. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD: SUBCONTRACT 78-177-S TO DEPT. OF ENERGY CONTRACT 50-54-5903 (BENDIX FIELD ENG. CORP.) BY EARTH SCIENCES INC., 1979, 1396 PP. PLUS PLATES.

DUNCAN, W. E., AND H. G. FISK. CENTRAL WYOMING PHOSPHATE ROCK - CHARACTER, PROCESSING, AND ECONOMICS. UNIV. OF WYO. NAT. RES. RESEARCH INST. BULL. 6, 1957, 60 PP.

EBERL, E. BENEFICIATION OF CALCIUM PHOSPHATE BY CALCINATION, THE MATERIAL BALANCE. RUDARSKO - METALURSKI ZBORNIK, NO. 2-3, 1970, PP. 275-283.

GARRAND CORPORATION. PHOSPHATE RESERVES OF SOUTHEASTERN IDAHO. U.S. DEPT. OF AGR. CONTRACT NO. 50-820, 1975 (?), 1102 PP.

GULBRANDSEN, R. A. SOME COMPOSITIONAL FEATURES OF PHOSPHORITES OF THE PHOSPHORIA FORMATION. IN INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, PP. 99-102.

HALE, L. A., ED. ANATOMY OF THE WESTERN PHOSPHATE FIELD. INTERMOUNTAIN ASSOC. OF GEOL. 15TH ANN. FIELD CONF., 1967, 287 PP., 3 PLATES.

HARRIS, R. A., D. F. DAVIDSON, AND B. P. ARNOLD. BIBLIOGRAPHY OF THE GEOLOGY OF THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY BULL. 1018, 1954, 89 PP.

HORBERG, L., V. NELSON, AND V. CHURCH. STRUCTURAL TRENDS IN CENTRAL WESTERN WYOMING. GEOL. SOC. OF AMERICA BULL., V, 60, 1949, PP. 183-216.

LANE, D. W. THE PHOSPHORIA AND GOOSE EGG FORMATIONS IN WYOMING. GEOL. SURVEY OF WYO., PRELIM. REPT. 12, 1973, 24 PP.

LINES, G. C., AND W. R. GLASS. WATER RESOURCES OF THE THRUST BELT OF WESTERN WYOMING. U.S. GEOL. SURVEY HYDROL. INV. ATLAS MAP HA-539, 1975.

LOVE, J. D. GEOLOGIC MAP OF THE GROS VENTRE JUNCTION QUADRANGLE, TETON COUNTY, WYOMING. U.S. GEOL. SURVEY OPEN FILE REPT. 75-334, 1975, 1 SHEET.

LOVE, J. D. GEOLOGIC MAP OF THE TETON VILLAGE QUADRANGLE, TETON COUNTY, WYOMING. U.S. GEOL. SURVEY OPEN FILE MAP 75-335, 1975, 1 SHEET.

LOVE, J. D., AND H. F. ALBEE. GEOLOGIC MAP OF THE JACKSON QUADRANGLE, TETON COUNTY, WYOMING, IN FOLIO OF THE JACKSON QUADRANGLE, WYO. U.S. GEOL. SURVEY MISC. INV. MAP I-769-A, 1972.

LOVE, J. D., J. C. REED, JR., R. L. CHRISTIANSEN, AND J. R. STACY. GEOLOGIC BLOCK DIAGRAM AND TECTONIC HISTORY OF THE TETON REGION, WYOMING - IDAHO. U.S. GEOL. SURVEY MISC. INV. MAP I-730, 1972.

MCKELVEY, V. E. THE PHOSPHORIA, PARK CITY, AND SHEDHORN FORMATIONS IN THE WESTERN PHOSPHATE FIELD. U.S. GEOL. SURVEY PROF. PAPER 313-A, 1959, PP. 1-47, 3 PLATES.

RULE, A. R., D. C. DAHLIN, AND A. J. FERGUS. FLOTATION OF CARBONATE AND SILICATE MINERALS FROM PARTIALLY ALTERED PHOSPHATE ROCK OF THE PHOSPHORIA FORMATION. PRES. AT ISMA TECHNICAL/ECON. CONF., ORLANDO, FLA., OCT. 23-27, 1979, 1978, 11 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. PRES. AT SME FALL MEETING AND EXHIBIT, ST. LOUIS, MO., OCT. 19-21, 1977, 17 PP.

RULE, A. R., D. E. KIRBY, AND D. C. DAHLIN. RECENT ADVANCES IN BENEFICIATION OF WESTERN PHOSPHATES. MIN. ENG., JANUARY 1978, PP. 37-40.

SCHROEDER, M. L. GEOLOGIC MAP OF THE CLAUSE PEAK QUADRANGLE, LINCOLN, SUBLETTE, AND TETON COUNTIES, WYOMING. U.S.GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-1092, 1973.

SCHROEDER, M. L. GEOLOGIC MAP OF THE CAMP DAVIS QUADRANGLE, TETON COUNTY, WYOMING. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-1160, 1974.

SCHROEDER, M. L. GEOLOGIC MAP OF THE BULL CREEK QUADRANGLE, TETON AND SUBLETTE COUNTIES, WYOMING. U.S. GEOL. SURVEY GEOL. QUADRANGLE MAP GQ-1300, 1976.

SHELDON, R. P. STRATIGRAPHY OF THE PHOSPHORIA FORMATION IN THE JACKSON HOLE REGION, WYOMING. IN WYOMING GEOL. ASSOC. 11TH ANN. FIELD CONF. (JACKSON HOLE), 1956, PP. 66-69.

SHELDON, R. P. PHYSICAL STRATIGRAPHY OF THE PHOSPHORIA FORMATION IN NORTHWESTERN WYOMING. U.S. GEOL. SURVEY BULL. 1042-E, 1957, PP. 105-185, PLATES.

SHELDON, R. P. PHYSICAL STRATIGRAPHY AND MINERAL RESOURCES OF PERMIAN ROCKS IN WESTERN WYOMING. U.S. GEOL. SURVEY PROF. PAPER 313-B, 1963, PP. 49-277.

SHELDON, R. P., R. G. WARING, M. A. WARNER, AND R. A. SMART. STRATIGRAPHIC SECTIONS OF THE PHOSPHORIA FORMATION IN WYOMING, 1949-50. U.S. GEOL. SURVEY CIRC. 307, 1953, 45 PP.

U.S. BUREAU OF LAND MANAGEMENT. STATE OF WYOMING LAND STATUS. U.S. BUR. OF LAND MANAGEMENT MAP, 1:500,000-SCALE, 1978, 1 SHEET.

U.S. GEOLOGICAL SURVEY. MINERAL AND WATER RESOURCES OF WYOMING. U.S. CONGRESS - SENATE DOC. 76, 1960, PP. 14-16, 145-147.

U.S. GEOLOGICAL SURVEY. DRIGGS, IDAHO; WYOMING, 1-DEGREE BY 2-DEGREE TOPOGRAPHIC MAP. U.S. GEOL. SURVEY, 1:250,000-SCALE MAP, 1955, 1 SHEET.

FOREIGN DEPOSITS

ALGERIA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DJEBEL ONK
SEQUENCE NUMBER: 7210250001

NATION: ALGERIA
SUBDIVISION: ANNABA
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 34 DEG 43 MIN 00 SEC
LONGITUDE: E 08 DEG 00 MIN 00 SEC
UTM - ZONE: 32 HEMISPHERE: NORTHERN
NORTHING: 3841881 EASTING: 408431
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 835 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP
SONEREM (GOVERNMENT OWNED)

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
UNDIFFERENTIATED	500,000,000	500,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1969	1965

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
2	P205	24.6	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
MINING MAGAZINE. VOL. 121, NO. 2, AUGUST 1969, P. 120.

SOURCE FOR RECORD 2:
PHOSPHORUS AND POTASSIUM. NO. 15. JAN/FEB 1965, PP 17 - 21.

DEPOSIT HISTORICAL INFORMATION

-------EXPLORATION METHODS-------
CORE DRILLING

YEAR OF DISCOVERY: 1900
YEAR OF INITIAL PRODUCTION: 1966

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: MASSIVE
CONTROLLING FEATURES: FOLDING

MINERALIZED ZONE:
AVERAGE DEPTH: 22.5 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE THICKNESS: 33 METERS
STRIKE/DIP: N80E/02N

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 22.5 METERS

LITHOLOGY:
NAME OF FORMATION: METLAOUI FORMATION
GEOLOGIC AGE: PALEOCENE
DEFORMATION DESCRIPTION: MINOR FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
DOLOMITE	CARBONATES
KAOLINITE	SILICATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 12000
UNITS: MT ORE/DAY
DESCRIPTION OF COVER:
SAND, GRAVEL;
HARD ROCKS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LOCATION: ALGERIA
LATITUDE: N 34 43 00
LONGITUDE: E 08 00 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK
DISTANCE (KM): 2.3
DESTINATION FACILITY: MILL (ON-SITE)
LOCATION: ALGERIA
LATITUDE: N 34 43 00
LONGITUDE: E 08 00 00

BENEFICIATION:
METHOD: CLASSIFIER
DESIGN CAPACITY: 12000
UNITS: MT ORE/DAY
---------- DESCRIPTION OF MILLING -------
ORE/ CRUSH/GRIND/SCREEN/STOCKPILE/DESLIME/
CALCINE/GRIND/WASH/SCREEN/DRY/SHIP

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P_2O_5	71	30.6	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE)
LOCATION: ALGERIA
LATITUDE: N 34 43 00
LONGITUDE: E 08 00 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DISTANCE (KM): 340
DESTINATION FACILITY: PORT
LOCATION: ALGERIA

BIBLIOGRAPHY RECORDS

AFCEP QUARTERLY JOURNAL. ISSUE NO. 3, SEPTEMBER 1980, P. 36.

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980, PP. 141-144.

DE VOTO, R. H. AND D. N. STEVENS (EDITORS). URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, PP. 343-345.

GOUDJIL, L. (SONAREM). THE PRESENT SITUATION AND OUTLOOK FOR PHOSPHATE ROCK IN ALGERIA. PAPER PRESENTED TO THE RAW MATERIALS COMMITTEE, I. S. M. A., NOVEMBER 1979.

PELITTI, E. WORLD PHOSPHATE STUDY DEPOSIT EVALUATION. DECEMBER 1980.

PHOSPHOROUS AND POTASSIUM. NO 15, JAN/FEB 1965, PP. 17-21.

PHOSPHOROUS AND POTASSIUM. NO 77, MAY/JUNE 1975, PP. 17.

PHOSPHOROUS AND POTASSIUM. NO 81, JAN/FEB 1976, PP. 15.

PHOSPHOROUS AND POTASSIUM. NO 94, JAN/FEB 1979, PP. 15

ANGOLA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: LACUNGA RIVER
SEQUENCE NUMBER: 7620750001

NATION: ANGOLA
SUBDIVISION: ZAIRE
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: S 06 DEG 57 MIN 00 SEC
LONGITUDE: E 12 DEG 52 MIN 00 SEC
UTM - ZONE: 33 HEMISPHERE: SOUTHERN
NORTHING: 9231295 EASTING: 264290
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 100 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
GOVERNMENT CONTROLLED

ALTERNATE NAMES
KINDONAKASI
GUINDONALAXI

OWNERSHIP	STATUS
PHOSPHATE EXREACTION CO. OF ANGOLA (FOSFANG)	OWNER
BULGAREOMINA (OF BULGARIA)	OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY
URANIUM	U3O8	RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
INDICATED	------	27,500,000
INFERRED	200,000,000	------
UNITS	MT ORE	MT ORE
YEAR/DATA	1981	1981

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
2	P2O5	19.4	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
MINING JOURNAL. ANGOLAN PHOSPHATE MINING. MARCH 13, 1981.

SOURCE FOR RECORD 2:
BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1951

--------EXPLORATION METHODS--------
AERIAL SURVEY/PETROLEUM EXPLORATION

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

TYPE OF MINERALIZED ZONE:
AVERAGE DEPTH: 2.0 METERS MINIMUM DEPTH: 0.1 METER
AVERAGE THICKNESS: 0.55 METER

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 2.0 METERS MINIMUM THICKNESS: 0.1 METER

LITHOLOGY:
GEOLOGIC AGE: EOCENE
DEFORMATION DESCRIPTION: NO DEFORMATION
ROCK TYPE:
SAND IS ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

FERTILIZERS INTERNATIONAL. ANGOLA IS ALSO TO CAPITILIZE ON ITS PHOSPHATE ROCK RESERVES. APRIL 1981.

MINING JOURNAL. ANGOLAN PHOSPHATE MINING. MARCH 13, 1981.

AUSTRALIA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CHRISTMAS ISLAND NO. 1 SEQUENCE NUMBER: 6020050001

NATION: AUSTRALIA SUBDIVISION: CHRISTMAS ISLAND
TYPE OF OPERATION: SURFACE CURRENT STATUS: PRODUCER
LATITUDE: S 10 DEG 25 MIN 19 SEC LONGITUDE: E 105 DEG 42 MIN 57 SEC
UTM - ZONE: 48 HEMISPHERE: SOUTHERN NORTHING: 8847918 EASTING: 578351
POINT OF REFERENCE: ORE BODY PRECISION: 10 KILOMETERS
ELEVATION: 300 METERS PRECISION: 10 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1981

ALTERNATE NAMES
CHRISTMAS ISLAND
CHRISTMAS ISLAND NO. 2

OWNERSHIP	STATUS
COMMONWEALTH OF AUSTRALIA	OWNER
COMMONWEALTH OF NEW ZEALAND	OWNER
CHRISTMAS ISLAND PHOSPHATE COMMISSION (CIPC)	OPERATOR
BRITISH PHOSPHATE COMMISSION (BPC)	OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INDICATED	200,000,000
UNITS	MT ORE
YEAR/DATA	1966

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P	16	WT-PCT
	P	14	WT-PCT
	P	11.5	WT-PCT

RESERVE-RESOURCE - REMARKS

ALL RECORDS: THE INDICATED ORE RESERVE IS FOR THE ENTIRE ISLAND, AND IS DIVIDED INTO THREE HORIZONS:

"A" ORE (DEEPEST) = 16 PERCENT PHOSPHORUS
"B" ORE (MIDDLE HORIZON) = 14 PERCENT PHOSPHORUS
"C" ORE (UPPER HORIZON) = 11-12 PERCENT PHOSPHORUS

MINING AT CHRISTMAS ISLAND NO. 1 INVOLVES HORIZONS "A" PLUS "B".

SOURCE FOR RECORD 1:

TYRER, T. G. THIS IS CHRISTMAS, THE PHOSPHATE ISLAND. PUBLISHED FOR THE CHRISTMAS ISLAND PHOSPHATE COMMISSION BY THE NEW ZEALAND DAIRY EXPORTER.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1887
YEAR OF INITIAL PRODUCTION: 1900

----------EXPLORATION METHODS----------
CORE DRILLING/BEDROCK SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: IRREGULAR

MINERALIZED ZONE:
  AVERAGE DEPTH: 2 METERS MINIMUM DEPTH: 1 METER
  AVERAGE THICKNESS: 4.5 METERS

UNCONSOLIDATED MATERIAL:
  AVERAGE THICKNESS: 2 METERS MINIMUM THICKNESS: 1 METER

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
  ROCK TYPE:
    LIMESTONE LIES UNDER ORE; NEAR ORE
    PHOSPHORITE IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
  METHOD: STRIPPING
  CAPACITY: 6800 UNITS: MT ORE/DAY
  DESCRIPTION OF COVER:
    SAND, GRAVEL;
    SAND, SILT
  AVERAGE COVER THICKNESS: 2 METERS

TRANSPORTATION (ORE):
  ORIGINATING FACILITY: MINE LOCATION: CHRISTMAS ISL. NO. 1
  LATITUDE: S 10 25 19 LONGITUDE: E 105 42 57
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: TRUCK
  DESTINATION FACILITY: MILL (ON-SITE) LOCATION: CHRISTMAS ISLAND MILL
  LATITUDE: S 10 25 19 LONGITUDE: E 105 42 57

BENEFICIATION:
  METHOD: SIZING
  DESIGN CAPACITY: 6800
  UNITS: MT ORE/DAY

------DESCRIPTION OF MILLING ------
ORE/STOCKPILE/WASH/SCREEN SIZE/DRY/
DUST RECOVERY/STOCKPILE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	72	36.0	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK

ORIGINATING FACILITY: MILL (ON-SITE)	LOCATION: CHRISTMAS ISLAND MILL
LATITUDE: S 10 25 19	LONGITUDE: E 105 42 57
PERCENT SHIPPED: 100	
METHOD OF TRANSPORTATION: CONVEYOR	DISTANCE (KM): 0.67
DESTINATION FACILITY: PORT	LOCATION: DOCKSIDE AT MILL
LATITUDE: S 10 25 19	LONGITUDE: E 105 42 57

BIBLIOGRAPHY RECORDS

AUSTRALIAN GOVERNMENT PUBLISHING SERVICE. COMMISSION OF INQUIRY INTO THE VIABILITY OF THE CHRISTMAS ISLAND PHOSPHATE INDUSTRY. FEBRUARY 1980.

_____. CHRISTMAS ISLAND ANNUAL REPORT. DEPARTMENT OF HOME AFFAIRS. 1978-79.

BRITISH SULPHUR CORPORATION. DEVELOPMENT OF WASH/SCREEN PROCESS TO BENEFICIATE CHRISTMAS ISLAND B-GRADE PHOSPHATES. BASED ON A PAPER SUBMITTED TO THE CONFERENCE OF THE AUSTRALIAN INSTITUTE OF MINING AND METALLURGY BY J. S. HOARE, 1971.

BRITISH PHOSPHATE COMMISSION. CHRISTMAS ISLAND PHOSPHATE. BROCHURE, 1976.

DORR-OLIVER LABORATORIES INC. UTILIZATION OF CHRISTMAS ISLAND "C" ROCK. PREPARED FOR THE BRITISH PHOSPHATE COMMISSIONERS, 27 JULY 1962.

FLUOSOLIDS CALCINATION OF CHRISTMAS ISLAND PHOSPHATE ROCK, PROGRESS REPORT NO. 1. PREPARED FOR THE BRITISH PHOSPHATE COMMISSIONERS, 11 JANUARY 1974.

HOARE, JOHN. PHOSPHATE RAW MATERIALS AND FERTILIZERS; PART II - A CASE OF MARGINAL RAW MATERIALS. THE BRITISH PHOSPHATE COMMISSIONERS.

PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA. CONSERVATION OF ENDANGERED SPECIES ON CHRISTMAS ISLAND. REPORT FROM THE HOUSE OF REPRESENTATIVES STANDING COMMITTEE ON ENVIRONMENT AND CONSERVATION, OCTOBER 1974.

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES. REACTION OF C-GRADE PHOSPHATE WITH LIME, PART II. ADELAIDE, SOUTH AUSTRALIA, AUGUST 1971.

_____. CALCINATION OF B-GRADE PHOSPHATE. ADELAIDE, SOUTH AUSTRALIA, 8/81.

TYRER, T. G. THIS IS CHRISTMAS, THE PHOSPHATE ISLAND. PUBLISHED FOR THE CHRISTMAS ISLAND PHOSPHATE COMMISSION BY THE NEW ZEALAND DAIRY EXPORTER.

URANIFEROUS PHOSPHATE RESOURCES OF THE FREE WORLD. CHAPTER 5 OF SURVEY REPORT BY EARTH SCIENCES INC., TO U. S. DEPT. OF ENERGY, GJBX 110 (79) GRAND JUNCTION, COLORADO.

WHITE, W. S. SUPERPHOSPHATE FROM CHRISTMAS ISLAND PHOSPHATE ROCK. NEW ZEALAND FERTILIZER MANUFACTURER'S RESEARCH ASSOCIATION, 1 FEBRUARY 1971.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CHRISTMAS ISLAND NO. 2 SEQUENCE NUMBER: 6020050002

NATION: AUSTRALIA
TYPE OF OPERATION: SURFACE
LATITUDE: S 10 DEG 25 MIN 19 SEC
UTM - ZONE: 48 HEMISPHERE: SOUTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 300 METERS
DATUM: SEA LEVEL

SUBDIVISION: CHRISTMAS ISLAND
CURRENT STATUS: DEVELOPING DEPOSIT
LONGITUDE: E 105 DEG 42 MIN 57 SEC
NORTHING: 8847918 EASTING: 578351
PRECISION: 10 KILOMETERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
CHRISTMAS ISLAND
CHRISTMAS ISLAND NO. 1

OWNERSHIP	STATUS
COMMONWEALTH OF AUSTRALIA	OWNER
COMMONWEALTH OF NEW ZEALAND	OWNER
CHRISTMAS ISLAND PHOSPHATE COMMISSION (CIPC)	OPERATOR
BRITISH PHOSPHATE COMMISSION (BPC)	OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INDICATED	200,000,000
UNITS	MT ORE
YEAR/DATA	1966

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P	16	WT-PCT
	P	14	WT-PCT
	P	11.5	WT-PCT

RESERVE-RESOURCE - REMARKS

ALL RECORDS: THE INDICATED ORE RESERVE IS FOR THE ENTIRE ISLAND, AND IS DIVIDED INTO THREE HORIZONS:

"A" ORE (DEEPEST) = 16 PERCENT PHOSPHORUS
"B" ORE (MIDDLE HORIZON) = 14 PERCENT PHOSPHORUS
"C" ORE (UPPER HORIZON) = 11-12 PERCENT PHOSPHORUS

MINING OF CHRISTMAS ISLAND NO. 2 WOULD INVOLVE MINING THE REMAINDER OF THE "B" HORIZON AFTER THE "A" HORIZON IS DEPLETED BY CHRISTMAS ISLAND NO. 1 MINING.

SOURCE FOR RECORD 1:
TYRER, T. G. THIS IS CHRISTMAS, THE PHOSPHATE ISLAND. PUBLISHED FOR THE CHRISTMAS ISLAND PHOSPHATE COMMISSION BY THE NEW ZEALAND DAIRY EXPORTER.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD: ----------EXPLORATION METHODS----------
ORE-MINERAL IN PLACE CORE DRILLING/BEDROCK SAMPLING
YEAR OF DISCOVERY: 1887

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: IRREGULAR

MINERALIZED ZONE:
AVERAGE DEPTH: 2 METERS MINIMUM DEPTH: 1 METER
AVERAGE THICKNESS: 2 METERS

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 2 METERS MINIMUM THICKNESS: 1 METER

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

LIMESTONE	LIES UNDER ORE
PHOSPHORITE	IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

BIBLIOGRAPHY RECORDS

AUSTRALIAN GOVERNMENT PUBLISHING SERVICE. COMMISSION OF INQUIRY INTO THE VIABILITY OF THE CHRISTMAS ISLAND PHOSPHATE INDUSTRY. FEBRUARY 1980.

_____. DEPARTMENT OF HOME AFFAIRS. CHRISTMAS ISLAND ANNUAL REPORT 1978-79.

BRITISH SULPHUR CORPORATION. DEVELOPMENT OF WASH/SCREEN PROCESS TO BENEFICIATE CHRISTMAS ISLAND B-GRADE PHOSPHATES. BASED ON A PAPER SUBMITTED TO THE CONFERENCE OF THE AUSTRALIAN INSTITUTE OF MINING AND METALLURGY BY J. S. HOARE, 1971.

BRITISH PHOSPHATE COMMISSION. CHRISTMAS ISLAND PHOSPHATE. BROCHURE, 1976.

DORR-OLIVER LABORATORIES INC. UTILIZATION OF CHRISTMAS ISLAND "C" ROCK. PREPARED FOR THE BRITISH PHOSPHATE COMMISSIONERS, 27 JULY 1962.

FLUOSOLIDS CALCINATION OF CHRISTMAS ISLAND PHOSPHATE ROCK, PROGRESS REPORT NO. 1. PREPARED FOR THE BRITISH PHOSPHATE COMMISSIONERS, 11 JANUARY 1974.

HOARE, JOHN. PHOSPHATE RAW MATERIALS AND FERTILIZERS; PART II - A CASE OF MARGINAL RAW MATERIALS. THE BRITISH PHOSPHATE COMMISSIONERS.

PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA. CONSERVATION OF ENDANGERED SPECIES ON CHRISTMAS ISLAND. REPORT FROM THE HOUSE OF REPRESENTATIVES STANDING COMMITTEE ON ENVIRONMENT AND CONSERVATION, OCTOBER 1974.

THE AUSTRALIAN MINERAL DEVELOPMENT LABORATORIES. REACTION OF C-GRADE PHOSPHATE WITH LIME, PART II. ADELAIDE, SOUTH AUSTRALIA, AUGUST 1971.

_____. CALCINATION OF B-GRADE PHOSPHATE. ADELAIDE, SOUTH AUSTRALIA, 8/81.

TYRER, T. G. THIS IS CHRISTMAS, THE PHOSPHATE ISLAND. PUBLISHED FOR THE CHRISTMAS ISLAND PHOSPHATE COMMISSION BY THE NEW ZEALAND DAIRY EXPORTER.

URANIFEROUS PHOSPHATE RESOURCES OF THE FREE WORLD. CHAPTER 5 OF SURVEY REPORT BY EARTH SCIENCES INC., TO U. S. DEPT. OF ENERGY, GJBX 110 (79) GRAND JUNCTION, COLORADO.

WHITE, M. S. SUPERPHOSPHATE FROM CHRISTMAS ISLAND PHOSPHATE ROCK. NEW ZEALAND FERTILIZER MANUFACTURER'S RESEARCH ASSOCIATION, 1 FEBRUARY 1971.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: WONARAH
SEQUENCE NUMBER: 6020250018

NATION: AUSTRALIA
SUBDIVISION: NORTHERN TERRITORY
TYPE OF OPERATION: UNKNOWN
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: S 19 DEG 50 MIN 00 SEC
LONGITUDE: E 136 DEG 20 MIN 00 SEC
UTM - ZONE: 53 HEMISPHERE: SOUTHERN
NORTHING: 7806541 EASTING: 639631
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
MINING LEASES

OWNERSHIP
REGIS MINES NL

STATUS
OWNER

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INFERRED	900,000,000
UNITS	MT ORE
YEAR/DATA	1980

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	15.7	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
REGISTER OF AUSTRALIAN MINING. PHOSPHATE: READY STOCKS DWINDLE. 1980, PP. 78.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1966

-------EXPLORATION METHODS-------
DRILLING/RADIOACTIVITY SURVEY

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 31 METERS
MINIMUM DEPTH: 17 METERS
AVERAGE LENGTH: 23500 METERS
AVERAGE WIDTH: 5500 METERS
AVERAGE THICKNESS: 23 METERS

LITHOLOGY:
NAME OF FORMATION: WONRAH BEDS GEOLOGIC AGE: MIDDLE CAMBRIAN
ROCK TYPE:

SILT	LIES OVER ORE
CHERT	LIES OVER ORE
SANDSTONE	LIES OVER ORE
PHOSPHATIC MUDSTONE	IS ORE

LITHOLOGY:
NAME OF FORMATION: UNDIFFERENTIATED BASEMENT
DEFORMATION DESCRIPTION: MINOR FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION DURING DEFORMATION
ROCK TYPE:

UNSPECIFIED EXTRUSIVE	LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
QUARTZ	FORMS OF SIO2
CHERT	FORMS OF SIO2

BIBLIOGRAPHY RECORDS

AUSTRALIAN MINES HANDBOOK, PHOSPHATE SECTION. 1976-1977.

HOWARD, PETER F. EXPLORATION FOR PHOSPHORITE IN AUSTRALIA. ECON. GEOL., VOL. 67, 1972, PP. 1180-1192.

HOWARD, PETER F. AND M. J. HOUGH. ON THE GEOCHEMISTRY AND ORIGIN OF THE D TREE, WONARAH AND SHERRIN CREEK PHOSPHATE DEPOSITS OF THE GEORGINA BASIN, NORTHERN AUSTRALIA. ECON. GEOL., VOL. 74, 1979, PP. 260-284.

HOWARD, PETER F. AND F. A. PERRINO. WONORAH PHOSPHATE DEPOSIT, GEORGINA BASIN, NORTHERN TERRITORY. A.I.M.M. NO. 4, IND. MINS. AND ROCKS, 1976, PP. 273-277.

REGISTER OF AUSTRALIAN MINING. PHOSPHATE: READY STOCKS DWINDLE. 1980, PP. 78.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DUCHESS
SEQUENCE NUMBER: 6020350001

NATION: AUSTRALIA
SUBDIVISION: QUEENSLAND
TYPE OF OPERATION: SURFACE
CURRENT STATUS: TEMPORARY SHUTDOWN
LATITUDE: S 21 DEG 53 MIN 00 SEC
LONGITUDE: E 139 DEG 58 MIN 00 SEC
UTM - ZONE: 54 HEMISPHERE: SOUTHERN
NORTHING: 7579869 EASTING: 393245
POINT OF REFERENCE: ORE BODY
PRECISION: 5 KILOMETERS
ELEVATION: 396 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
DUCHESS AND ARDMORE
ARDMORE
PHOSPHATE HILL

OWNERSHIP	STATUS
WESTERN MINING CORPORATION HOLDING LTD.	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
MEASURED	504,00,000	------
INDICATED	------	914,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1980	1980

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	18.3	WT-PCT
2	P2O5	16.9	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORDS 1 AND 2:
PHOSPHORUS AND POTASSIUM. THE PHOSPHATE DEPOSITS OF AUSTRALIA.
NO. 110, NOV/DEC 1980, PP. 21.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1966
YEAR OF INITIAL PRODUCTION: 1975
YEAR OF FINAL PRODUCTION: 1978

----------EXPLORATION METHODS----------
TRENCHING/CORE DRILLING/SUBSURFACE
GEOLOGICAL MAPPING/MAGNETIC SURVEY/
SEISMIC/SURVEY/PERCUSSION/DRILLING/ROTARY
DRILLING/OTHER DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR

MINERALIZED ZONE:
AVERAGE THICKNESS: 11 METERS

LITHOLOGY:
NAME OF FORMATION: BEETLE CREEK FORMATION GEOLOGIC AGE: CAMBRIAN
DEFORMATION DESCRIPTION: FAULTING
ROCK TYPE:

SILT	GANGUE
SHALE	GANGUE
CHERT	GANGUE; LIES UNDER ORE
SILTSTONE	GANGUE; LIES UNDER ORE
LIMESTONE	LIES OVER ORE; NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
COLLOPHANE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
CAPACITY: 800 UNITS: MT ORE/DAY
DESCRIPTION OF COVER:
SAND, SILT;
HARDPAN

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: ARDMORE/DUCHESS MINE
LATITUDE: S 21 53 00 LONGITUDE: E 139 58 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 1.5
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: ARDMORE/DUCHESS MILL
LATITUDE: S 21 53 00 LONGITUDE: E 139 58 00

BENEFICIATION:
METHOD: WASHING ---------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 800 ORE/CRUSH/SCREEN/WASH/SCREEN/BLEND/DESLIME/
UNITS: MT ORE/DAY SCREEN/DRY/STOCKPILE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	85	33.9	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: ARDMORE/DUCHESS MILL
LATITUDE: S 21 53 00 LONGITUDE: E 139 58 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: PORT LOCATION: TOWNSVILLE

BIBLIOGRAPHY RECORDS

COOK, P. J. AUSTRALIAN PHOSPHATE ROCK DEPOSITS AND OCCURRENCES. FERT. MIN. POT. IN ASIA & PACIFIC, AUSTRALIAN MINES HANDBOOK, PHOSPHATE SECTION, 1976-77. HAWAII 1979.

COOK, P. J. PETROLOGY AND GEOCHEMISTRY OF THE PHOSPHATE DEPOSITS OF NORTHWEST QUEENSLAND, AUSTRALIA. ECON. GEOL., VOL. 67, 1972, PP. 1193-1213.

COOK, P. J. AND J. H. SHERGOLD. PROTEROZOIC AND CAMBRIAN PHOSPHORITE OF ASIA AND AUSTRALIA - A PROGRESS REPORT. HAWAII 1979.

ENGINEERING AND MINING JOURNAL. AUSTRALIA'S DUCHESS PHOSPHATE MINE DUE ON STREAM AT 1 MILLION TPY. MARCH 1977.

FLEMING, M. R., A. M. STONE, AND G. ROMENSKY. AUTOMATIC TRAIN LOADING OF ROCK PHOSPHATE AT PHOSPHATE HILL. AUSTRALASIAN I. M. & M. CONFERENCE, QUEENSLAND, SEPT. 1978.

HOWARD, P. F. EXPLORATION FOR PHOSPHORITE IN AUSTRALIA - A CASE HISTORY. ECON. GEOL., VOL. 67, 1972, PP. 1180-1192.

MINING MAGAZINE. NEW QUEENSLAND PHOSPHATE MINE ON STREAM. MAY 1975, PP.337.

MINING MAGAZINE. PHOSPHATE PLANS MARCH 1976.

PHOSPHORUS AND POTASSIUM. THE PHOSPHATE DEPOSITS OF AUSTRALIA. NO. 110, NOV/DEC. 1980, PP. 21.

ROGERS, J. K., AND N. J. CRASE. THE PHOSPHATE HILL ROCK PHOSPHATE DEPOSIT, NORTHWEST QUEENSLAND, AUSTRALIA - AN OUTLINE OF GEOLOGICAL DEVELOPMENT. PROC. FERT. RAW MATERIALS WORKSHOP, HONOLULU 1979, JUNE 1980.

RUSSELL, R. T., AND N. A. TRUEMAN. THE GEOLOGY OF THE DUCHESS PHOSPHATE DEPOSITS, NORTHWESTERN QUEENSLAND, AUSTRALIA. ECON. GEOL., VOL. 66, 1971, PP. 1186-1214.

THOMSON, L. D. AND R. T. RUSSELL. DISCOVERY, EXPLORATION AND INVESTIGATIONS OF PHOSPHATE DEPOSITS IN QUEENSLAND. PROC. AUST. INT. MIN. MET., NO. 240, DECEMBER 1971.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: LADY ANNIE/LADY JANE
SEQUENCE NUMBER: 6020350008

NATION: AUSTRALIA
SUBDIVISION: QUEENSLAND
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: S 19 DEG 40 MIN 00 SEC
LONGITUDE: E 139 DEG 10 MIN 00 SEC
UTM - ZONE: 54 HEMISPHERE: SOUTHERN
NORTHING: 7824499 EASTING: 307794
POINT OF REFERENCE: ORE BODY
PRECISION: GREATER THAN 10 KILOMETERS
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
LADY ANNIE AND LADY JANE
LADY ANNIE

OWNERSHIP	STATUS
WESTERN MINING CORPORATION HOLDING LTD.	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	486,000,000
UNITS	MT ORE
YEAR/DATA	1980

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	17.0	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
PHOSPHOROUS AND POTASSIUM. THE PHOSPHATE DEPOSITS OF AUSTRALIA. NO. 110, NOV/DEC. 1980, PP. 76-77.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1967

----------EXPLORATION METHODS----------
SUBSURFACE GEOLOGICAL MAPPING/CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION

MINERALIZED ZONE:
AVERAGE DEPTH: 5.5 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE LENGTH: 26000 METERS
AVERAGE WIDTH: 5000 METERS
AVERAGE THICKNESS: 5.5 METERS

LITHOLOGY:

NAME OF FORMATION:	BEETLE CREEK FORMATION	GEOLOGIC AGE: CAMBRIAN
ROCK TYPE:		
SILTSTONE	LIES OVER ORE; NEAR ORE	
SANDSTONE	LIES OVER ORE; NEAR ORE	
CHERT	LIES OVER ORE; NEAR ORE	
PHOSPHORITE	IS ORE	
LIMESTONE	LIES UNDER ORE; ENCLOSES ORE	
DOLOMITE	LIES UNDER ORE; ENCLOSES ORE	

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	PHANERITIC-FINE
APATITE	PHOSPHATES	

BIBLIOGRAPHY RECORDS

COOK, P. J. PETROLOGY AND GEOCHEMISTRY OF THE PHOSPHATE DEPOSITS OF NORTHWEST QUEENSLAND, AUSTRALIA. ECON. GEOL., VOL. 67, 1972, PP. 1193-1213.

EARTH SCIENCES, INC. URANIFEROUS PHOSPHATE RESOURCES OF THE FREE WORLD. U.S. DEPT. ENERGY CONTRACT, GJBX-110 (79), GRAND JUNCTION, COLORADO, PP. 13-20.

HOWARD, P. F. EXPLORATION FOR PHOSPHORITE IN AUSTRALIA -- A CASE HISTORY. ECON. GEOL., VOL. 67, 1972, PP. 1180-1192.

MINING JOURNAL. DEVELOPMENT AT DUCHESS. FEB. 8, 1974.

MINING MAGAZINE. PHOSPHATE PLANS. MARCH 1976.

PHOSPHORUS AND POTASSIUM. THE PHOSPHATE DEPOSITS OF AUSTRALIA. NO. 110, NOV/DEC 1980 PP. 21.

REGISTER OF AUSTRALIAN MINING. 1980, PP. 76-77.

ROGERS, J. K. AND R. E. REEVERS. LADY ANNIE-LADY JANE PHOSPHATE DEPOSITS, GEORGINA BASIN, QUEENSLAND INC., KNIGHT, C. L. (ED). ECONOMIC GEOLOGY OF AUSTRALIA AND PAPUA, NEW GUINEA, 4. IND. MINES AND ROCKS, AUST. MIN. METALL. MONOGRAPH, SER.8, PP. 251-265.

THOMSON, L. D., AND R. T. RUSSELL. DISCOVERY, EXPLORATION AND INVESTIGATIONS OF PHOSPHATE DEPOSITS IN QUEENSLAND. PROC. AUST. INST. MIN. MET., NO. 240, DEC. 1971.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: D TREE
SEQUENCE NUMBER: 6020350035

NATION: AUSTRALIA
SUBDIVISION: QUEENSLAND
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: S 19 DEG 43 MIN 00 SEC
LONGITUDE: E 138 DEG 57 MIN 00 SEC
UTM - ZONE: 54 HEMISPHERE: SOUTHERN
NORTHING: 7818704 EASTING: 285139
POINT OF REFERENCE: ORE BODY
PRECISION: 5 KILOMETERS
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
D'TREE

OWNERSHIP	STATUS
INTERNATIONAL MINERAL & CHEMICAL DEV. CORP. (I.M.C.)	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	250,000,000
UNITS	MT ORE
YEAR/DATA	1980

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	18.6	WT-PCT

RESERVE/RESERVE - REMARKS

SOURCE FOR RECORD 1:
PHOSPHOROUS AND POTASSIUM. THE PHOSPHATE DEPOSITS OF AUSTRALIA. NO. 110, NOV/DEC 1980

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1967

----------EXPLORATION METHODS----------
SUBSURFACE GEOLOGICAL MAPPING/CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
CONTROLLING FEATURES: FOLDING

MINERALIZED ZONE:
AVERAGE DEPTH: 15 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE LENGTH: 22500 METERS
AVERAGE WIDTH: 5500 METERS
AVERAGE THICKNESS: 0 METERS

LITHOLOGY:
NAME OF FORMATION: BEETLE CREEK GEOLOGIC AGE: CAMBRIAN
ROCK TYPE:

PHOSPHORITE	IS ORE
SANDSTONE	LIES OVER ORE; NEAR ORE
CHERT	LIES OVER ORE; NEAR ORE
SILTSTONE	LIES OVER ORE; NEAR ORE
LIMESTONE	LIES UNDER ORE; ENCLOSES ORE
DOLOMITE	LIES UNDER ORE; ENCLOSES ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES

BIBLIOGRAPHY RECORDS

AUSTRALIAN MINES HANDBOOK. 1977/78.

HOWARD, P. F. EXPLORATION FOR PHOSPHORITE IN AUSTRALIA--A CASE HISTORY. ECON. GEOL. VOL. 67, 1972, PP. 1180-1192.

HOWARD, P. F. AND M. J. HOUGH. ON THE GEOCHEMISTRY AND ORIGIN OF THE D TREE, WONARAH AND SHERRIN CREEK PHOSPHORITE DEPOSITS OF THE GEORGINA BASIN; NORTHERN AUSTRALIA. ECON. GEOL. VOL. 74, 1979, PP. 260-284.

PHOSPHORUS AND POTASSIUM. THE PHOSPHATE DEPOSITS OF AUSTRALIA. PHOSPHORUS AND POTASSIUM. NO. 110, NOV/DEC. 1980.

REGISTER OF AUSTRALIAN MINING. 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NORTHERN DEPOSITS

SEQUENCE NUMBER: 6020350047

NATION: AUSTRALIA
SUBDIVISION: QUEENSLAND
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: S 18 DEG 40 MIN 00 SEC
LONGITUDE: E 138 DEG 20 MIN 00 SEC
UTM - ZONE: 54 HEMISPHERE: SOUTHERN
NORTHING: 7934082 EASTING: 218694
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
MINERALS ONLY

ALTERNATE NAMES
RIVERSLEIGH
PHANTOM HILLS
MT. JENNIFER
BABBLING BROOK HILL
MT. O'CONNOR
HIGHLAND PLAINS
QUEENS LAND - NORTHERN DEPOSIT

OWNERSHIP	STATUS
WESTERN MINING CORP. HOLDING LTD.	OWNER
QUEENSLAND PHOSPHATE LTD.	OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
MEASURED	176,000,000	------	------
INDICATED	------	38,000,000	------
INFERRED	------	------	27,000,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1972	1972	1972

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	14.7	WT-PCT
2	P205	16.8	WT-PCT
3	P205	17.4	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORDS 1, 2, AND 3:
ROGERS, J. K., AND R. E. KEEVERS. ECONOMIC GEOLOGY OF AUST. AND PAPUA, NEW GUINEA. IND. MINES AND ROCKS, AUST. MIN. METALL. MONOGRAPH, 4. SEC. 8, PP. 251-265.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD: ORE-MINERAL IN PLACE
EXPLORATION METHODS: DRILLING/TEST SHAFT/GEOCHEMICAL
YEAR OF DISCOVERY: 1966

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: FAULTING

LITHOLOGY:
NAME OF FORMATION: BORDER WATERHOLE FORMATION GEOLOGIC AGE: MIDDLE CAMBRIAN
DEFORMATION DESCRIPTION: FAULTING
GEOLOGIC AGE OF DEFORMATION: AFTER CAMBRIAN
ROCK TYPE:

PHOSPHORITE	IS ORE
MUDSTONE	IS ORE; LIES OVER ORE
SILTSTONE	IS ORE; LIES OVER ORE
CHERT	IS ORE; LIES OVER ORE
SANDSTONE	NEAR ORE; LIES OVER ORE
LIMESTONE	IS ORE; LIES OVER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES

BIBLIOGRAPHY RECORDS

AUSTRALIAN MINES HANDBOOK. 1977/78.

COOK, P. AUSTRALIAN PHOSPHATE ROCK DEPOSITS AND OCCURRENCES: FERTILIZER MINERAL POTENTIAL IN ASIA AND THE PACIFIC. FERTILIZER RAW MATERIALS RESOURCES WORKSHOP AUG. 20-24, HONOLULU, HAWAII, 1979.

HOWARD, P. F. EXPLORATION FOR PHOSPHORITE IN AUSTRALIA--A CASE HISTORY. ECON. GEOL. VOL. 67, 1972, PP. 1180-1192.

REGISTER OF AUSTRALIAN MINING, 1980.

ROGERS, J. K. AND R. E. KEEVERS. ECONOMIC GEOLOGY OF AUST. AND PAPUA, NEW GUINEA. IND. MINES AND ROCKS, AUST. MIN. METALL. MONOGRAPH, 4 SEC. 8., PP. 231-245.

THOMSON, L. D. AND R. T. RUSSELL. DISCOVERY, EXPLORATION, & INVESTIGATIONS OF PHOSPHATE DEPOSITS IN QUEENSLAND. PROC. AUST. INST. MIN. MET., NO. 240, DEC. 1971.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SHERRIN CREEK/LILY CREEK
SEQUENCE NUMBER: 6020350051

NATION: AUSTRALIA
SUBDIVISION: QUEENSLAND
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: S 20 DEG 10 MIN 00 SEC
LONGITUDE: E 138 DEG 44 MIN 00 SEC
UTM - ZONE: 54 HEMISPHERE: SOUTHERN
NORTHING: 7768591 EASTING: 263094
POINT OF REFERENCE: ORE BODY
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
ENGINE

OWNERSHIP
CONTINENTAL OIL CORPORATION

STATUS
OWNER

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
INFERRED	233,000,000	212,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1978	1978

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	16	WT-PCT
2	P205	13.4	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: RESERVES ATTRIBUTED TO SHERRIN CREEK DEPOSIT.
RECORD 2: RESERVES ATTRIBUTED TO LILY CREEK DEPOSIT.

SOURCE FOR RECORDS 1 AND 2:
AUSTRALIAN MINES HANDBOOK. 1977/1978.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1966

-------EXPLORATION METHODS-------
DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY; BEDDING

MINERALIZED ZONE:
STRIKE/DIP: N01W/01S
AVERAGE WIDTH: 5500 METERS
AVERAGE LENGTH: 22500 METERS
AVERAGE THICKNESS: 27 METERS

LITHOLOGY:
NAME OF FORMATION: BEETLE CREEK FORMATION GEOLOGIC AGE: MIDDLE CAMBRIAN
DEFORMATION DESCRIPTION: NO DEFORMATION
ROCK TYPE:

PHOSPHORITE	IS ORE
SILTSTONE	ENCLOSES ORE
DOLOMITE	NEAR ORE
CHERT	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES

BIBLIOGRAPHY RECORDS

AUSTRALIAN MINES HANDBOOK. 1977/1978.

COOK, P. J. AND J. H. SHERGOLD. PROTEROZOIC-CAMBRIAN PHOSPHORITES. PROJECT 156 UNESCO-IUGS, WORKSHOP, AUGUST 1978, REGISTER OF AUSTRALIAN MINING. 1980.

HOWARD, P. F. EXPLORATION FOR PHOSPHORITE IN AUSTRALIA--A CASE HISTORY. ECON. GEOL., VOL. 67, 1972, PP. 1180-1192.

HOWARD, P. F. AND M. J. HOUGHT. ON THE GEOCHEMISTRY & ORIGIN OF THE D TREE, WONARAH AND SHERRIN CREEK PHOSPHORITE DEPOSITS OF THE GEORGINA BASIN, NORTHERN AUSTRALIA. ECON. GEOL., VOL. 74, 1979, PP. 260-284.

REGISTER OF AUSTRALIAN MINING. 1980.

BRAZIL

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ITATAIA
SEQUENCE NUMBER: 3510110002

NATION: BRAZIL
SUBDIVISION: CEARA
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: S 04 DEG 30 MIN 00 SEC
LONGITUDE: W 40 DEG 00 MIN 00 SEC
UTM - ZONE: 24 HEMISPHERE: SOUTHERN
NORTHING: 9502560 EASTING: 389058
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
  GOVERNMENT CLAIMS

ALTERNATE NAMES
  ANOMALY 62
  ITATIRA
  ITATIRA COMPLEX

OWNERSHIP	STATUS
NUCLEBRAS, BRAZILIAN NUCLEAR ENERGY COMPANY	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		BYPRODUCT
URANIUM	U308 CONTENT	PRIMARY PRODUCT

DEPOSIT HISTORICAL INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  AUXILIARY-MINERAL IN PLACE
YEAR OF DISCOVERY: 1976

---------EXPLORATION METHODS---------
RADIOACTIVITY SURVEY/MAGNETIC SURVEY/
CORE DRILLING/SATELLITE SURVEY

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SHEAR ZONE: DISSEMINATED
MODE OF ORIGIN: HYDROTHERMAL
SHAPE OF ORE BODY: MASSIVE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
  AVERAGE DEPTH: 0 METERS
  AVERAGE THICKNESS: 200 METERS

LITHOLOGY:
  NAME OF FORMATION: CAICO COMPLEX GEOLOGIC AGE: PRECAMBRIAN
  ROCK TYPE:

GNEISS	ENCLOSES ORE
MARBLE	ENCLOSES ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
QUARTZ	FORMS OF SIO2

BIBLIOGRAPHY RECORDS

ENGINEERING AND MINING JOURNAL. A RISE IN URANIUM RESERVES TO 193,800 MT. JULY 1979.

ENGINEERING AND MINING JOURNAL. BRAZIL - THE RECOVERY OF URANIUM FROM PHOSPHATE DEPOSITS. ENG. MIN. JOUR., NOV. 1970.

ENGINEERING AND MINING JOURNAL. BRAZIL'S ESTIMATED URANIUM RESERVES. ENG. MIN. JOUR., DEC. 1980.

IBRAFOS, I ENCONTRO NACIONAL DE ROCHA FOSFATICA, BRASILIA 19 E 20, ABRIL 1979, IBRAFOS, 1980.

MINERACAO E METALURGIA. ESTUDOS DE CONCENTRACAO FISICA DE UMA ROCHA FOSFATICA/ FELDSPATICA CONTENDO URANO. ANO XLIV #424, DECEMBER 1980.

PHOS. & POT. NUCLEBRAS, AND PETROFERTIL, FEASIBILITY STUDY AT ITALAIA. NO. 105, 1980.

SILVA, A. ANALYSIS OF PHOSPHATE ROCK PRODUCTION IN BRAZIL., PAULO ABIB ENGINEERING, SAO PAULA, 1979.

WILLIAMS, H. E. O CLIMA DO BRAZIL. BRAZIL, SERV. GEOL. MIN., NOTAS PRELIMARES E ESTUDOS, NUM. 8. RIO DE JANEIRO, 1937.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CATALAO (GOIASFERTIL)
SEQUENCE NUMBER: 3510170013

NATION: BRAZIL
SUBDIVISION: GOIAS
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: S 18 DEG 08 MIN 00 SEC
LONGITUDE: W 47 DEG 48 MIN 00 SEC
UTM - ZONE: 23 HEMISPHERE: SOUTHERN
NORTHING: 7992929 EASTING: 203708
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 930 METERS
PRECISION: 500 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
ALVARAS (CLAIMS) 90 AND 91 (1968)

ALTERNATE NAMES
CATALAO 1 (GOIASFERTIL)
GOIASFERTIL CATALAO
OUVIDOR
FAZENDA CHAPADAO

OWNERSHIP
GOIAS FERTILIZANTES (GOIASFERTIL)

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

YEAR OF INITAL PRODUCTION: 1976

--------EXPLORATION METHODS----------
MAGNETIC SURVEY/RADIOACTIVITY SURVEY/
CORE DRILLING/TEST PIT

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: DISSEMINATED
MODE OF ORIGIN: MAGMATIC DIFFERENTIATION
SHAPE OF ORE BODY: MASSIVE

MINERALIZED ZONE:
AVERAGE DEPTH: 5 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE THICKNESS: 250 METERS

LITHOLOGY:
NAME OF FORMATION: CATALAO I COMPLEX
GEOLOGIC AGE: UPPER CRETACEOUS
ROCK TYPE:
CARBONATITE IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
SILEXITE	FORMS OF SIO2
VERMICULITE	SILICATES
LIMONITE	OXIDES (EXCLUDING SIO2)
ILMENITE	OXIDES (EXCLUDING SIO2)
BARITE	SULFIDES
PYROCHLORE	MULTIPLE OXIDES CONTAINING NB,TA,TI
ANATASE	MULTIPLE OXIDES CONTAINING NB,TA,TI

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 12200 UNITS: MT ORE/DAY
AVERAGE COVER THICKNESS: 5 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: BRAZIL
LATITUDE: S 18 08 00 LONGITUDE: W 47 48 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 1
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 18 08 00 LONGITUDE: W 47 48 00

BENEFICIATION:
METHOD: FLOTATION ----------DESCRIPTION OF MILLING----------
DESIGN CAPACITY: 12200 ORE/CRUSHED/SIZED/GROUND/DESLIMED/FLOTATION/
UNITS: MT ORE/DAY THICKENED/FILTERED/DRIED

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	61	38	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 18 08 00 LONGITUDE: W 47 48 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: REFINERY LOCATION: UBERABA, BRAZIL

BIBLIOGRAPHY RECORDS

ALVES, B. P. DISTRITO NIOBIO-TITANIFERO DE TAPIRA. BRAZIL, DEPTO. NAC. PROD. MIN. BOL. 108, 1960.

DIBBLE, M. F. THE DEVELOPMENT OF THE FOSFAGO PHOSPHATE ROCK CONCENTRATOR, BRAZIL. AIME FALL MEETING, MINNEAPOLIS, MINNESOTA, 1980.

DYER, P. C. OS DOMOS ULTRABASICO-ALCALINOS DOS ARREDORES DE CATALAO - GEOLOGIC REGIONAL. OURO PRETO, REV ESC MINAS VOL XXVII, NO 4, PP. 170-176.

EITEN, G. THE CERRADO VEGETATION OF BRAZIL. THE BOTANICAL REVIEW, VOL. 38, NO. 2, 1972, PP. 201-341.

LEONARDOS, O. H. CARBONATITOS COM APATITA E PIROCLORO. BRAZIL DEPTO. NAC. PROD. MIN. AVULSO NO. 80, RIO DE JANEIRO, 1956.

MC NEIL, M. BRAZIL'S URANIUM/THORIUM DEPOSITS. GEOLOGY, RESERVES AND POTENTIAL. MILLER FREEMAN, SAN FRANCISCO, CALIF., 1978.

MURPHY, M., H. WOLLENBERG, B. STRISOWER, H. BOWMAN, S. FLEXSER, AND I. CARMICHAEL. URANIUM IN ALKALINE ROCKS. UNIVERSITY OF CALIFORNIA, DEPARTMENT OF ENERGY CONTRACT, GRAND JUNCTION, GJBX-78, 1978.

SILVA, A. F., JR, AND R. B. NETO. ANALYSIS OF PHOSPHATE ROCK PRODUCTION IN BRAZIL. JULY, 1979.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CATALAO-FOSFAGO
SEQUENCE NUMBER: 3510170017

NATION: BRAZIL
SUBDIVISION: GOIAS
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: S 18 DEG 08 MIN 00 SEC
LONGITUDE: W 47 DEG 48 MIN 00 SEC
UTM - ZONE: 23 HEMISPHERE: SOUTHERN
NORTHING: 7992929 EASTING: 203708
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 850 METERS
PRECISION: 500 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
PRIVATE LEASE

ALTERNATE NAMES
FOSFAGO
FAZENDA
CHAPADAO AT OUVIDOR

OWNERSHIP
FOSFAGO DE GOIAS, S A (FOSFAGO)

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	73,000,000
UNITS	MT ORE
YEAR/DATA	1978

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	13.5-18	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
SCHREIBER, E. J. AND N. PARKS. BRAZIL'S N-P-K GOALS SLIP BEHIND SCHEDULE. E&MJ, FEBRUARY 1978, PP. 82-85.

DEPOSIT HISTORICAL INFORMATION

-------EXPLORATION METHODS-------
CORE DRILLING

YEAR OF DISCOVERY: 1971
YEAR OF INITIAL PRODUCTION: 1979

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: DISSEMINATED
MODE OF ORIGIN: MAGMATIC DIFFERENTIATION
SHAPE OF ORE BODY: MASSIVE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
AVERAGE DEPTH: 31 METERS MINIMUM DEPTH: 10 METERS
AVERAGE THICKNESS: 33 METERS

LITHOLOGY:
NAME OF FORMATION: CATALAO COMPLEX GEOLOGIC AGE: CRETACEOUS
ROCK TYPE:
CARBONATITE IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
COLLOPHANE	PHOSPHATES
ILMENITE	OXIDES (EXCLUDING SIO2)
BARITE	SULFIDES
LIMONITE	OXIDES (EXCLUDING SIO2)
PYROCHLORE	MULTIPLE OXIDES CONT. NB,TA,TI
SILEXITE	FORMS OF SIO2

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 6600 UNITS: MT ORE/DAY
AVERAGE COVER THICKNESS: 31 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: BRAZIL
LATITUDE: S 18 08 00 LONGITUDE: W 47 48 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 2
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 18 08 00 LONGITUDE: W 47 48 00

BENEFICIATION:
METHOD: FLOTATION ---------- DESCRIPTION OF MILLING ----------
DESIGN CAPACITY: 4600 ORE CRUSHED/SIZED/ MAGNETIC SEPARATION/GROUND/
UNITS: MT ORE/DAY MAGNETIC SEPARATION/DESLIMING/FLOTATION/THICKENED/
PUMPED/THICKENED/FILTERED/DRIED

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	92	38	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 18 08 00 LONGITUDE: W 47 48 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: REFINERY LOCATION: UBERABA, BRAZIL

BIBLIOGRAPHY RECORDS

ALVES, B. P. DISTRITO NIOBIO-TITANIFERO DE TAPIRA. BRAZIL, DEPTO. NAC. PROD. MIN. BOL. 108, 1960.

DIBBLE, M. F. THE DEVELOPMENT OF THE FOSFAGO PHOSPHATE ROCK CONCENTRATOR, BRAZIL. AIME FALL MEETING, MINNEAPOLIS, MINNESOTA, 1980.

DYER, R. C. OS DOMOS ULTRABASICO-ALCALINOS DOS ARREDORES DE CATALAO - GEOLOGIC REGIONAL. OURO PRETO, REV. ESC MINAS, VOL. XXVII, NO. 4, PP. 170-176.

EITEN, G. THE CERRADO VEGATATION OF BRAZIL. THE BOTANICAL REVIEW, VOL. 38, NO. 2, 1972, PP. 201-341.

LEONARDOS, O. H. CARBONATITOS COM APATITA E PIROCLORO. BRAZIL DEPTO. NAC. PROD. MIN. AVULSO NO. 80, RIO DE JANEIRO, 1956.

MC NEIL, M. BRAZIL'S URANIUM/THORIUM DEPOSITS. GEOLOGY, RESERVES AND POTENTIAL. MILLER FREEMAN, SAN FRANCISCO, CALIF., 1978.

MURPHY, M., H. WOLLENBERG, B. STRISOWER, H. BOWMAN, S. FLEXSER, AND I. CARMICHAEL. URANIUM IN ALKALINE ROCKS. UNIVERSITY OF CALIFORNIA, DEPARTMENT OF ENERGY CONTRACT, GRAND JUNCTION, GJBX-78, 1978.

SCHREIBER, E. J. AND N. PARKS. BRAZIL'S N-P-K GOALS SLIP BEHIND SCHEDULE. E&MJ, FEBRUARY 1978, PP. 82-85.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ARAXA-ARAFERTIL
SEQUENCE NUMBER: 3510230009

NATION: BRAZIL
SUBDIVISION: MINAS GERAIS
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: S 19 DEG 32 MIN 46 SEC
LONGITUDE: W 46 DEG 53 MIN 49 SEC
UTM - ZONE: 23 HEMISPHERE: SOUTHERN
NORTHING: 7837771 EASTING: 300975
POINT OF REFERENCE: ORE BODY
PRECISION: 100 METERS
ELEVATION: 935 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
  STATE LEASE

ALTERNATE NAMES
  BARREIRO
  BARREIRO DE ARAXA

OWNERSHIP	STATUS
ARAXA S.A. FERTILIZANTES E PRODUCTOS QUIMICOS(ARAFERTIL)	
OWNER-OPERATOR	
COMPANHIA MINERADORA DO PIROCLORE DE ARAXA	OPERATOR
COMPANHIA BRASILEIRA DE METALURGIA MINERACAD	OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

--------EXPLORATION METHODS--------
ELABORATE EXPLORATION PROGRAM

YEAR OF DISCOVERY: 1946
YEAR OF INITIAL PRODUCTION: 1977

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
  AVERAGE DEPTH: 0 METERS
  MINIMUM DEPTH: 0 METERS

LITHOLOGY:
  NAME OF FORMATION: ARAXA ALKALINE PIPE
  GEOLOGIC AGE: OLDER THAN TRIASSIC
  ROCK TYPE:
    CARBONATITE IS ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
COLLOPHANE	PHOSPHATES
MAGNETITE	OXIDES (EXCLUDING SIO2)
GOETHITE	OXIDES (EXCLUDING SIO2)
MONAZITE	PHOSPHATES
ILMENITE	OXIDES (EXCLUDING SIO2)
QUARTZ	FORMS OF SIO2
PYROCHLORE	MULTIPLE OXIDES CONTAINING NB, TA, TI

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 8500 UNITS: MT ORE/DAY
AVERAGE COVER THICKNESS: 0 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: BRAZIL
LATITUDE: S 19 32 46 LONGITUDE: W 46 53 49
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 3
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 19 32 46 LONGITUDE: W 46 53 49

BENEFICIATION:
METHOD: FLOTATION ---------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 8500 ORE/CRUSH/SCREEN/MAGNETIC SEPARATION/GRIND
UNITS: MT ORE/DAY CLASSIFY/DESLIME/FLOTATION/THICKEN/FILTER/DRY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	49	35	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 19 32 46 LONGITUDE: W 46 53 49
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK
DESTINATION FACILITY: REFINERY LOCATION: BRAZIL

BIBLIOGRAPHY RECORDS

BARCELLOS DA SILVA, A., M. MARCHETTO, AND O. MOREIRA DE SOUZA. GEOLOGICA DO COMPLEXO CARBONATITICO DE ARAXA (BARREIRO). MINAS GERAIS, MIN. E. MET, 1980.

BRAZIL, ESTADO DE MINAS GERAIS, INSTITUTO DE TECNOLOGIA INDUSTRIAL, AVULSO 2, BELO HORIZONTE, 1948.

GUIMARAES, D. NOTA PRELIMINAR SOBRE A JAZIDA DE BARREIRO, MUNICIPIO DE ARAXA, MINAS GERAIS. BRAZIL, ESTADO DE MINAS GERAIS, INSTITUTO DE TECHNOLIGIA INDUSTRIAL, AVULSO 2, BELO HORIZONTE, 1948.

_____. RELATORIO SOBRE A JAZIDA DE PIROCLORO DE BARREIRO, ARAXA, MINAS GERAIS; BRAZIL, DEPTO. NAC. PROD. MINERAL, BOLETIN 103, 1957.

BRITISH SULPHUR CORP., LTD. A WORLD SURVEY OF PHOSPHATE DEPOSITS. LONDON, 1964, PP. 160.

DESOUZA, J.M., AND CASTRO, L.O. GEOL. DO DEP. DE TERRAS RARES NIOBIOSE URANO DA AREA ZERO, ARAXA(MG). SOC. BRASILEIRA GEOL. CONF. 22ND, ANAIS, 1968, PP. 97-102.

GROSSI SAD, J. H. AND N. TORRES. GEOLOGIA E RECURSOS MINERALS DO DISTRITO DO BARREIRO, ARAXA, MG, GEOLOGIA E SONDAGENS, LTDA.; RESTRICTED EDITION FOR BRAZIL DEPTO. NAC. PROD. MIN, MME, 3RD DISTRICT, N.D. (1975?)

_____. GEOLOGY AND MINERAL RESOURCES OF THE BARREIRO COMPLEX, ARAXA, BRAZIL. INT'L SYMP. CARBONATITES, POCOS DE CALDAS, L976.

GUIMARAES, D. NOTA PRELIMINAR SOBRE A JAZIDA DE BARREIRO, MUNICIPIO DE ARAXA, MINAS GERAIS.

LEONARDOS, O. H. CARBONATITOS COM APATITA E PIROCLORO. BRAZIL. DEPTO. NAC. PROD. MIN. AVULSO 8, 1956.

MCNEIL, M. BRAZIL'S URANIUM/THORIUM DEPOSITS. GEOLOGY, RESERVES, POTENTIAL. MILLER FREEMAN, SAN FRANCISCO, CALIF., 1978.

MENICUCCI SOBRINHO, L. ESTUDO QUIMICO DA APATITA DE ARAXA. BRAZIL, ESTADO DE MINAS GERAIS, INSTITUTO DE TECNOLOGIA INDUSTRIAL, AVULSO NO. 10, BELO HORIZONTE, 1949.

MURPHY M., H. WOLLENBURG, B. STRISOULR, H. BOWMAN, S. FLEXSER, AND I. CARMICHAEL. URANIUM IN ALKALINE ROCKS. UNIV. CALIFORNIA, DEPT. ENERGY CONTRACT GJBX-78- GRAND JUNCTION, 1978.

RECOMPOSICAO PAISAGISTICA DA JAZIDA DA ARAFERTIL:FATO-FERTIL, HOUSE ORGAN OF ARAFERTIL, ANO. I, NO. 11, DEC-JAN, 1980-81.

SA CAVALCANTE DE ALBUGUERQUE, G. DE A. AND GIANNERINI, J.B., OUTLOOK OF THE PHOSPHATE ROCK INDUSTRY IN BRAZIL, IBRAFOS (INSTITUTO BRAZILEIRO DO FOSFATO) RIO DE JANEIRA, 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: TAPIRA (VALEP)
SEQUENCE NUMBER: 3510230010

NATION: BRAZIL
SUBDIVISION: MINAS GERAIS
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: S 19 DEG 52 MIN 00 SEC
LONGITUDE: W 46 DEG 50 MIN 00 SEC
UTM - ZONE: 23 HEMISPHERE: SOUTHERN
NORTHING: 7802360 EASTING: 308034
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 1200 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
CLAIMS

ALTERNATE NAMES
VALEP
PILOES
FAZENDA CACHOEIRA
SALITRE
ANTAS

OWNERSHIP
FOSFERTIL, SA

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
UNDIFFERENTIATED	318,000,000
UNITS	MT ORE
YEAR/DATA	1978

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	8.2	WT-PCT

RESERVE-RESOURCES - REMARKS

SOURCE FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. NEW AND EXPANDING MINES AND PLANTS. OCTOBER 1978, PP. 63.

DEPOSIT HISTORICAL INFORMATION

----------EXPLORATION METHODS----------
CORE DRILLING/RADIOACTIVITY SURVEY/TRENCHING/
TEST PITS

YEAR OF DISCOVERY: 1950
YEAR OF INITIAL PRODUCTION: 1979

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

MODE OF ORIGIN: MAGMATIC DIFFERENTIATION
SHAPE OF ORE BODY: MASSIVE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
AVERAGE DEPTH: 0 METERS MINIMUM DEPTH: 0 METERS
AVERAGE THICKNESS: 60 METERS

LITHOLOGY:
NAME OF FORMATION: TAPIRA COMPLEX GEOLOGIC AGE: UPPER CRETACEOUS
DEFORMATION DESCRIPTION: INTRUSION
ROCK TYPE:

CARBONATITE	IS ORE
PYROXENITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUOR-HYDROXY APATITE	PHOSPHATES
ANATASE	MULTIPLE OXIDES CONTAINING NB,TA,TI
VERMICULITE	FORMS OF SIO2
PEROVSKITE	MULTIPLE OXIDES CONTAINING NB,TA,TI
MAGNETITE	OXIDES (EXCLUDING SIO2)

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 29900 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: BRAZIL
LATITUDE: S 19 52 00 LONGITUDE: W 46 50 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 4
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 19 52 00 LONGITUDE: W 46 50 00

BENEFICIATION:
METHOD: FLOTATION ----------DESCRIPTION OF MILLING----------
DESIGN CAPACITY: 29900 ORE CRUSHED/SIZED/GROUND/CONDITIONED/DESLIMED/
UNITS: MT ORE/DAY FLOATED/SHIPPED BY SLURRY PIPELINE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	54	36	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 19 52 00 LONGITUDE: W 46 50 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: PIPELINE DISTANCE (KM): 125
DESTINATION FACILITY: REFINERY LOCATION: UBERABA, BRAZIL

BIBLIOGRAPHY RECORDS

ALVES, B. P. DISTRITO NIOBIO-TITANIFERO DE TAPIRA. BRAZIL, DIV. FOM. PROD. MIN., BOL. 108, RIO, 1960.

BETZ, E. W. BENEFICIATION OF BRAZILIAN PHOSPHATES. PAPER 63, 13TH INTERNATIONAL MINING CONGRESS, WARSAW, 1979.

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, LONDON, 1980.

BRITISH SULPHUR CORP., LTD. A WORLD SURVEY OF PHOSPHATE DEPOSITS. LONDON, BRIT. SUL. CORP., LTD., 1964, PP. 162.

CRUZ, E. F., ET AL. ASPECTS OF THE SUPERFICIAL PHOSPHORUS AND TITANIUM DEPOSITS OF THE TAPIRA CARBONATITE COMPLEX, MINAS GERAIS, BRAZIL. 25TH GEOLOGICAL CONGRESS, ARACAJU, 1973.

EITEN, G. THE CERRADO VEGETATION OF BRAZIL. THE BOTANICAL REVIEW, VOL. 38, NO 2, APRIL-JUNE 1972.

ENGINEERING AND MINING JOURNAL. NEW AND EXPANDING MINES AND PLANTS. E&MJ, OCTOBER 1978, PP. 63

HARRINGTON, J.F. SOURCES OF FERTILIZER MINERALS IN S. AMERICA: A PRELIMINARY STUDY. USGS, BULL. 1240, 1966, PP. 34, 35.

LEONARDIS, O. CARBONATITOS COM APATITA E PIROCLORO. BRAZIL D.N.P.M., AVULSO 89, ANO, 1956.

MC NEIL, M. BRAZIL'S URANIUM/THORIUM DEPOSITS. GEOLOGY, RESERVES, POTENTIAL, MILLER FREEMAN, SAN FRANCISCO, CALIF., 1978.

MINERACAO E METALURGIA. VALEP COMECA COM 900 MIL TON/ANO DE CONCENTRADO FOSFATICO. MINERACAO E METALUGIO, 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: PATOS DE MINAS
SEQUENCE NUMBER: 3510230102

NATION: BRAZIL
SUBDIVISION: MINAS GERAIS
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: S 18 DEG 19 MIN 10 SEC
LONGITUDE: W 46 DEG 55 MIN 00 SEC
UTM - ZONE: 23 HEMISPHERE: SOUTHERN
NORTHING: 7973528 EASTING: 297431
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 826 METERS
PRECISION: 500 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
CLAIMS (ALVARA)

ALTERNATE NAMES
ROCINHA
COROMANDEL
PIRUBINHAS

OWNERSHIP	STATUS
FERTILIZANTES FOSFATADOS, SA (FOSFERTIL)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
MEASURED	256,353,000	------	------
INDICATED	------	87,262,000	------
INFERRED	------	------	110,058,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1976	1976	1976

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	13.01	WT-PCT
2	P205	10.82	WT-PCT
3	P205	5	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORDS 1, 2, AND 3:
COMPANHIA DE PESQUISA DE RECURSOS MINERALS, USING ENG ADAMIR G CHAVES, UNIDADE PROTOTIPO INTEGRANTE DO PROJETO FOSFATO DA CPRM: PAMPHLET, 12 PP., MARCH 31, 1976.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1974

----------EXPLORATION METHODS----------
CORE DRILLING/TRENCHING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED
MODE OF ORIGIN: SEDIMENTATION; METAMORPHISM
SHAPE OF ORE BODY: LENTICULAR; TABULAR
CONTROLLING FEATURES: FAULTING

MINERALIZED ZONE:

AVERAGE LENGTH: 3000 METERS
AVERAGE THICKNESS: 35 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE WIDTH: 400 METERS

LITHOLOGY:
NAME OF FORMATION: BAMBUI GROUP
GEOLOGIC AGE: PRECAMBRIAN
ROCK TYPE:

LIMESTONE	NEAR ORE
CHERT	NEAR ORE
PHOSPHORITE	IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
WAVELLITE	PHOSPHATES
CARNALLITE	OTHER
MICA	SILICATES
QUARTZ	FORMS OF SIO2
CHERT	FORMS OF SIO2

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
CAPACITY: 16000
UNITS: MT ORE/DAY
AVERAGE COVER THICKNESS: 10 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LOCATION: BRAZIL
LATITUDE: S 18 19 10
LONGITUDE: W 46 55 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK
DISTANCE (KM): 5
DESTINATION FACILITY: MILL (ON-SITE)
LOCATION: BRAZIL
LATITUDE: S 18 19 10
LONGITUDE: W 46 55 00

BENEFICIATION:
METHOD: FLOTATION
DESIGN CAPACITY: 16000
UNITS: MT ORE/DAY
------ DESCRIPTION OF MILLING ------
ORE CRUSHED/SIZED/CLASSIFIED/GROUND/
DESLIMING/DRIED/REGROUND

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P_2O_5	64	35	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 18 19 10 LONGITUDE: W 46 55 00
PERCENT SHIPPED: 100
DESTINATION FACILITY: FOB MILL

BIBLIOGRAPHY RECORDS

AMARAL, G. AND K. KAWASHITA. DETERMINACAO DA IDADE DO GRUPO BAMBUI PELO METODO RB-SR. SOC BRAS. GEOL. ANAIS., XXI CONGRESSO, PP. 214-217.

CATHCART, J. B. GEOLOGY AND MINERALOGY OF PHOSPHATE ROCK IN THE BAMBUI GROUP NEAR CEDRO DO ABAETE AND VICINITY, MINAS GERAIS, BRAZIL. USGS, PROJECT REPORT, (IR) BR-24, 1974.

CATHCART, J. B. PHOSPHATE INVESTIGATION IN BRAZIL. USGS, PROJECT REPORT (IR) BR-84, 1975.

CATHCART, J. B. PHOSPHORITE DEPOSITS NEAR PATOS DE MINAS, MINAS GERAIS, BRAZIL. SOCIETY OF MINING ENGINEERS OF AIME, PREPRINT 77-H-76, FOR PRESENTATION AT THE 1977 AIME ANNUAL MEETING, ATLANTA, GEORGIA - MAR. 6-10, 1977, 23 PP.

COMPANHIA DE PESQUISA DE RECURSOS MINERALS, USING ENG ADAMIR G CHAVES, UNIDADE PROTOTIPO INTEGRANTE DO PROJETO FOSFATO DA CPRM. PAMPHLET, 12 PP. MARCH 31, 1976.

COMPANHIA DE PESQUISA DE RECURSOS MINERAIS. ANNUAL REPORT. 1979 AND 1980.

ENGINEERING AND MINING JOURNAL. A REORGANIZATION OF BRAZILIAN STATE FERTILIZER COMPANIES. AUGUST 1980.

GUIMARAES, D., AND C. V. DUTRA. CONTRIBUICAO AO ESTUDO DA SERIE BAMBUI. BRAZIL, DEPT. NAC. MIN. PROD., DIV. GEOL. E MIN., BOL. 243, 270, 1969.

IBRAFOS, 1 ENCONTRO NACIONAL DE ROCHA FOSFATICA, DECEMBER 1980.

LADEIRA, E. A., AND E. D. LEAL. PHOSPHATE ROCK OF THE CEDRO DO ABAETE REGION, MINAS GERAIS, BRAZIL. 24TH IGC., 1972.

MINERACAO E METALURGIA PATOS DE MINAS, O INICIO DA AUTO-SUFICIENCIA EM FOSFATO. MINERACAO E METALURGIA, ANO XXXIX, NO. 372, MARCH 1976.

MINING JOURNAL. BRAZIL. MINING ANNUAL REVIEW. LONDON, 1978, PP. 383.

SCHILLER, E.A. MINERAL EXPLORATION AND MINING IN BRASIL- 1977. MINING MAGAZINE, SEPT. 1977, PP. 251.

SCHREIBER, E.J., AND N. PARKS. BRAZIL'S N-P-K GOALS SLIP BEHIND SCHEDULE. ENGINEERING AND MINING JOURNAL, FEB. 1978, PP. 82-85.

WORLD MINING. NEW P2O5 MINES AND CONCENTRATION PLANTS PLANNED. WORLD MINING, SEPT. 1976, PP. 53.

WORLD MINING. BRAZIL'S BUSY PHOSPHATE INDUSTRY. WORLD MINING, FEB. 1977, PP. 46-49.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ARAXA-CAMIG
SEQUENCE NUMBER: 3510230116

NATION: BRAZIL
SUBDIVISION: MINAS GERAIS
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: S 19 DEG 32 MIN 46 SEC
LONGITUDE: W 46 DEG 53 MIN 49 SEC
UTM - ZONE: 23 HEMISPHERE: SOUTHERN
NORTHING: 7837771 EASTING: 300975
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 935 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
STATE LEASE

OWNERSHIP	STATUS
ARAXA S A FERTILIZANTES E PRODUCTOS QUIMICOS (ARAFERTIL)	OPERATOR
COMPANHIA AGRICOLA DE MINAS GERAIS (CAMIG) (STATE-OWNED)	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

----------EXPLORATION METHODS---------
YEAR OF DISCOVERY: 1946 ELABORATE EXPLORATION PROGRAM
YEAR OF INITIAL PRODUCTION: 1976

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
AVERAGE DEPTH: 0 METERS
MINIMUM DEPTH: 0 METERS

LITHOLOGY:
NAME OF FORMATION: ARAXA ALKALINE PIPE GEOLOGIC AGE: OLDER THAN TRIASSIC
ROCK TYPE:
CARBONATITE IS ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
COLLOPHANE	PHOSPHATES
MAGNETITE	OXIDES (EXCLUDING SIO2)
GOETHITE	OXIDES (EXCLUDING SIO2)
MONAZITE	PHOSPHATES
ILMENITE	OXIDES (EXCLUDING SIO2)
QUARTZ	FORMS OF SIO2

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 3500 UNITS: MT ORE/DAY
AVERAGE COVER THICKNESS: 0 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: BRAZIL
LATITUDE: S 19 32 46 LONGITUDE: W 46 53 49
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 5
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 19 32 46 LONGITUDE: W 46 53 49

BENEFICIATION:
METHOD: MAGNETIC ---------- DESCRIPTION OF MILLING ---------
DESIGN CAPACITY: 3500 ORE CRUSHED/SIZED/MAGNETIC SEPARATION/
UNITS: MT ORE/DAY GROUND/CLASSIFIED/DESLIMED/DRIED

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	35	26.25	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 19 32 46 LONGITUDE: W 46 53 49
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 121
DESTINATION FACILITY: REFINERY LOCATION: UBERABA, BRAZIL

BIBLIOGRAPHY RECORDS

AMARAL, G., J. BUSHEE, U. G. CORDANI, K. KAWASHITA, AND J. H. REYNOLDS. POTASSIUM-ARGON AGES OF ALKALINE ROCKS FROM SOUTHERN BRAZIL. GEOCHIMICA E COSMOCHIMICA ACTA, VOL. 31, 1967, PP. 117-142.

BARCELLOS DA SILVA, A., M. MARCHETTO, AND O. MOREIRA DE SOUIZA. GEOLOGICA DO COMPLEXO CARBONATITICO DE ARAXA (BARREIRO), MINAS GERAIS. MIN E MET, 1980.

BARTON, W.P. COLIMBIUM AND TANTALUM, A MATERIALS SURVEY. USBM INF. CIR. 8120, 1962.

BRITISH SULPHUR CORP., LTD. A WORLD SURVEY OF PHOSPHATE DEPOSITS. LONDON, BRIT. SULPH. CORP., LTD., 1964, PP. 160.

DESOUZA, J.M., AND L. O. CASTRO. GEOL. DO DEP. DE TERRAS RARES NIOBIOSE URANO DA AREA ZERO, ARAXA(MG). SOC. BRASILEILA GEOL. CONF. 22ND, ANAIS, 1968, PP. 97-102.

GITTINS, J. SUMM. AND BIBLIOGRAPHICS OF CARBO. COMPLEXES IN: TUTTLE, O.F., AND GITTINS, JC, EDS., CARBONATITES; N.Y. INTERSCI. PUBLISH, 1966, PP. 417-540.

GROSSI, S. AND N. TORRES. GEOLOGY AND MINERAL RESOURCES OF THE BARREIRO COMPLEX, ARAXA, BRAZIL. INT'L SYMP. CARBONATITES, POCOS DE CALDAS, 1976.

GUIMARAES, D. NOTA PRELIMINAR SOBRE A JAZIDA DE BARREIRO, MUNICIPIO DE ARAXA, MINAS GERAIS. BRAZIL, ESTADO DE MINAS GERAIS, INSTITUTO DE TECNOLOGIA INDUSTRIAL, AVULSO 2, BELO HORIZONTE, 1948.

_____. RELATORIO SOBRE A JAZIDA DE PIROCLORO DE BARREIRO, ARAXA, MINAS GERAIS. BRAZIL, DEPTO NAC PROD MINERAL, BOLETIN 103, 1957.

HARRINGTON, J.F., ET AL. SOURCES OF FERT. MIN. IN S. AMER.; A PRELIM. STUDY. USGS BULL. 1240, 1966.

LEONARDOS, O. H. CARBONATITOS COM APATITA E PIROCLORO. BRAZIL, DEPTO. NAC. PROD. MIN. AVULSO 8, 1956.

LEONARDOS, O.H. CARBONATITOS COM APATITA E PIROCLORO NO ESTRANGEIRO E NO BRASIL. ENG. MIN. MET., RIO DE JANERO, VOL. 23, 1956, PP. 160-161.

MACIEL, A.C. AND P.R. CRUZ. PERFIL ANALITICO URANIO. DNPM, BOL. 27, BRAZIL, 1973.

MC NEIL, M. BRAZIL'S URANIUM/THORIUM DEPOSITS. GEOLOGY, RESERVES, POTENTIAL. MILLER FREEMAN, SAN FRANCISCO, CALIF., 1978.

MENICUCCI SOBRINHO, L. ESTUDO QUIMICO DA APATITA DE ARAXA. BRAZIL, ESTADO DE MINAS GERAIS, INSTITUTO DE TECNOLOGIA INDUSTRIAL, AVULSO NO. 10, BELO HORIZONTE, 1949.

MILLER, G.L. TANT. AND NIOBIUM. N.Y. ACADEMIC PRESS, 1959.

MURPHY M., H. WOLLENBURG, B. STRISOULR, H. BOWMAN, S. LEXSER, AND I. CARMICHAEL. URANIUM IN ALKALINE ROCKS. UNIVERSITY OF CALIFORNIA, DEPT. OF ENERGY CONTRACT GJBX-78-GRAND JUNCTION, 1978.

SA CAVALCANTE DE ALBUQUERQUE, G. DE A. AND GIANNERINI, J. B. OUTLOOK OF THE PHOSPHATE ROCK INDUSTRY IN BRAZIL. IBRAFOS (INSTITUTO BRAZILEIRO DO FOSFATO) RIO DE JANEIRO, 1980.

WARDE, J.M., ET AL. COLIMBIUM AND TANTALUM MIN. ORES AND ORE PREP. SISCO, F. T. AND EPREMIAN, E., EDS., COLIMBIUM AND TANTALUM, N.Y. WILEY, 1963.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: OLINDA-PAULISTA/IGARASSU
SEQUENCE NUMBER: 3510270003

NATION: BRAZIL
SUBDIVISION: PARAIBA
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: S 07 DEG 45 MIN 00 SEC
LONGITUDE: W 35 DEG 00 MIN 00 SEC
UTM - ZONE: 25 HEMISPHERE: SOUTHERN
NORTHING: 9142874 EASTING: 279423
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
CLAIMS

ALTERNATE NAMES
OLINDA-PAULISTA
IGARASSU
PROJECT FOSFORITA
PAULISTA-IGARASAU

OWNERSHIP
LUNDGREN GROUP, ET AL (FOSPERSA)

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INFERRED	50,000,000
UNITS	MT ORE
YEAR/DATA	1977

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	18	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
ANDREY, PAULO ABIB. BRAZIL'S BUSY PHOSPHATE INDUSTRY - NEW DISCOVERIES, NEW MINES PLANNED. WORLD MINING, FEBRUARY 1977, PP. 47.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOPHYSICAL ANOMALY
YEAR OF DISCOVERY: 1951

----------EXPLORATION METHODS----------
CORE DRILLING/RADIOACTIVITY SURVEY

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 37 METERS MINIMUM DEPTH: 4 METERS
AVERAGE THICKNESS: 1.5 METERS STRIKE/DIP: NORTH-SOUTH/SLIGHTLY EAST

LITHOLOGY:
NAME OF FORMATION: GRAMMAME, BASAL MEMBER GEOLOGIC AGE: CRETACEOUS
ROCK TYPE:

LIMESTONE	LIES OVER ORE
CLAY	LIES OVER ORE
PHOSPHORITE	IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
QUARTZ	FORMS OF SIO2

BIBLIOGRAPHY RECORDS

ABIB, PAULO, S. A. RESOURCES AND POTENTIAL USE OF DOMESTIC PHOSPHATE ROCK IN BRAZIL. 1979.

ANDERY, PAULO ABIB. BRAZIL'S BUSY PHOSPHATE INDUSTRY-NEW DISCOVERIES, NEW MINES PLANNED. WORLD MINING, FEBRUARY 1977, PP. 47.

BRITISH SULPHUR CORP. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

IBRAFOS. I ENCONTRO NACIONAL DE ROCHA FOSFATICA. BRAZIL, IBRAFOS, INST. BRAS. DO FOSFATO, BRASILIA 19 & 29 APRIL, 1979.

MC NEIL, M. BRAZIL'S URANIUM THORUM DEPOSITS. MILLER FREEMAN, SAN FRANCISCO, CALIF., 1979.

MIN. IND. COM., CONS. DESENV. IND. A INDUSTRIA BRASILEIRA DE FERTILIZANTES. BRAZIL. MIN. IND. COM., CONS. DESENV IND, BRASILIA, 1980.

SAAD, SAMIR. ASPECTOS ECONOMICOS DE APPROVEITAMENTO DE URANO ASSOCIADO AOS FOSFATOS DO NORDESTE. BRAZIL, COM. NAC. DE ENERGIA NUCLEAR, BOLETIM NO. 7, RIO DE JANEIRO, 1974.

SILVA, A. ANALYSIS OF PHOSPHATE ROCK PRODUCTION IN BRAZIL: OUTLOOK FOR AMMONIA, PHOSPHATE ROCK AND SULFUR IN LATIN AMERICA. 1979.

WHITE, M. G., AND C. T. PIERSON. A SUMMARY OF RADIOACTIVE MINERALS INVESTIGATIONS IN BRAZIL 1952-1960. PROJECT REPT. BRAZ. INV. (IRBR-26), USGS, APRIL 1970).

WILLIAMS, H. E. O CLIMA DO BRAZIL. BRAZIL, SERV. GEOL. E MIN., NOTAS PRELIMINARIES E ESTUDOS, NUMERO 8, RIO DE JANEIRO, 1937.

LOCATION AND GENERAL DESPOSIT INFORMATION

DEPOSIT NAME: IPANEMA I & II
SEQUENCE NUMBER: 3510430005

NATION: BRAZIL
SUBDIVISION: SAO PAULO
TYPE OF OPERATION: SURFACE
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: S 23 DEG 36 MIN 00 SEC
LONGITUDE: W 47 DEG 35 MIN 00 SEC
UTM - ZONE: 23 HEMISPHERE: SOUTHERN
NORTHING: 7055434 EASTING: 242736
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 900 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
LEASED CLAIMS

ALTERNATE NAMES
IPANEMA COMPLEX
MORRO DE ARAGOIABA
IPANEMA FEZENDA

OWNERSHIP
SERRANA, S A

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1920

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: DISSEMINATED
MODE OF ORIGIN: MAGMATIC DIFFERENTIATION
SHAPE OF ORE BODY: MASSIVE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
AVERAGE DEPTH: 0 METERS
AVERAGE THICKNESS: 200 METERS

LITHOLOGY:
NAME OF FORMATION: IPANEMA COMPLEX
GEOLOGIC AGE: CRETACEOUS
ROCK TYPE:
CARBONATITE IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
MAGNETITE	OXIDES (EXCLUDING SIO2)
VERMICULITE	SILICATES
BARITE	SULFIDES
ZIRCON	SILICATES
NEPHELINE SYENITE	SILICATES

BIBLIOGRAPHY RECORDS

AMARAL, G., J. BUSHEE, U. G. CORDANI, K. KAWASHITA, AND J. REYNOLDS. POTASSIUM-ARGON AGES OF ALKALINE ROCKS FROM SOUTHERN BRAZIL. GEOCHIMICA E COSMOCHIMICA ACTA, VOL. 31, 1967, PP. 117-142.

BRITISH SULPHUR CORP., LTD. A WORLD SURVEY OF PHOSPHATE DEPOSITS. 2ND ED., 1964, 206 PP.

DERBY, O. ON THE MAGNETITE ORE DISTRICTS OF JACUPIRANGA AND IPANEMA. SAO PAULO, BRAZIL. AM JOURNAL SCI VOL. 141, 1891, PP. 311-321.

DUPRE, L. MEMORIA SOBRE A FABICA DE FERRO DE SAO JOAO DE IPANEMA: ANNAES DA ESCOLA DE MINAS, NO. 4, RIO, 1918, PP. 49-90.

HARRINGTON, J. F., D. E. WARD, ET AL. SOURCES OF FERTILIZER MIN. IN SOUTH AMER., A PRELIM. STUDY. USGS BULL. 1240. 1966.

HIGHNETT, T. P., ED. FERTILIZER MANUAL. IFDC-UNIDO, DECEMBER, 1979.

INSTITUTO DE TECHNOLOGIA INDUSTRIAL. M. G., VOL. 5, FOLHA 10, BELO HORIZONTE.

LEONARDOS, O. H. CARBONATITOS COM APATITA E PIROCLORO. BRAZIL, DEPTO. NAC. PROD. MIN., AVULSO 80, RIO, 1956.

LEINZ, V. PETROLOGIA DAS JAZIDAS DE APATITA DE IPANEMA, S. P. BRAZIL, DEPT. NAC. PROD. MIN., VOL. 40, RIO, 1940, PP. 1-52.

MCKELVEY, V. E. PHOSPHATE DEP. USGS BULL. 1252-D, 1967.

MC NEIL, M. LATERITIC SOILS. SCIENTIFIC AMERICAN, NOV. 1964.

MORAES, L. J. DE. JAZIDAS DE APATITA DE IPANEMA, ESTADO DE SAO PAULO. BRAZIL, SERV. FOM. PROD. MIN., VOL. 27, RIO, 1938.

SILVA, A. F. JR, AND R. B. NETO. ANALYSIS OF PHOSPHATE ROCK PRODUCTION IN BRAZIL. JULY 1979.

TUTTLE, O.F., AND J. GITTINS. CARBONATITES. INTERSCIENCE PUB., JOHN WILEY & SONS, N.Y.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: JACUPIRANGA
SEQUENCE NUMBER: 3510430012

NATION: BRAZIL
SUBDIVISION: SAO PAULO
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: S 24 DEG 42 MIN 00 SEC
LONGITUDE: W 48 DEG 09 MIN 00 SEC
UTM - ZONE: 22 HEMISPHERE: SOUTHERN
NORTHING: 7265427 EASTING: 788369
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 30 METERS
PRECISION: 500 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
MORRO DA MINA

OWNERSHIP
SERRANA SA DE MINERACAO

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

-------EXPLORATION METHODS-------
CORE DRILLING

YEAR OF DISCOVERY: 1940
YEAR OF INITIAL PRODUCTION: 1943

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: DISSEMINATED
MODE OF ORIGIN: MAGMATIC DIFFERENTIATION
SHAPE OF ORE BODY: MASSIVE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
AVERAGE DEPTH: 0 METERS
AVERAGE THICKNESS: 50 METERS
STRIKE/DIP: NORTH-NORTHEAST/NO DIP

LITHOLOGY:
NAME OF FORMATION: JACUPIRANGA COMPLEX
GEOLOGIC AGE: LOWER CRETACEOUS
DEFORMATION DESCRIPTION: INTRUSION
GEOLOGIC AGE: LOWER CRETACEOUS
ROCK TYPE:

CARBONATITES	IS ORE
PERIDOTITE	IS ORE
PYROXENITE	IS ORE
NEPHELINE SYENITE	IS ORE
GRANODIORITE	ENCLOSES ORE
SCHIST	ENCLOSES ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
DOLOMITE	CARBONATES
MAGNETITE	OXIDES (EXCLUDING SIO2)
SERPENTINE	SILICATES
BARITE	SULFIDES
CALCITE	CARBONATES
FORSTERITE	SILICATES
PHLOGOPITE	SILICATES
PYRITE	SULFIDES
PYROCHLORE	MULTIPLE OXIDES CONTAINING NB,TA,TI

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 14500 UNITS: MT ORE/DAY
AVERAGE COVER THICKNESS: 0 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: BRAZIL
LATITUDE: S 24 42 00 LONGITUDE: W 48 09 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 1.2
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 24 42 00 LONGITUDE: W 48 09 00

BENEFICIATION:
METHOD: FLOTATION
DESIGN CAPACITY: 14500
UNITS: MT ORE/DAY

--------- DESCRIPTION OF MILLING -------
ORE CRUSHED/SIZED/GROUND/DESLIMED/
CONDITIONED/FLOATED/THICKENED/FILTERED/
DRIED/LOAD-OUT

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	73	35	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 24 42 00 LONGITUDE: W 48 09 00
PERCENT SHIPPED: 70
METHOD OF TRANSPORTATION: TRUCK
DESTINATION FACILITY: REFINERY LOCATION: BRAZIL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: BRAZIL
LATITUDE: S 24 42 00 LONGITUDE: W 48 09 00
PERCENT SHIPPED: 30
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 215
DESTINATION FACILITY: PORT LOCATION: SAO PAULO

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, LONDON, 1980.

DERBY, O. A. MAGNETITE ORE DISTRICT OF JACUPIRANGA AND IPANEMA, SAO PAULO, BRAZIL. AM. JOUR. SCI., 3RD SER VOL. XLI, 1891, PP. 308-311.

LEONARDIS, O. CARBONATITOS COM APATITA E PIROCHLORO. BRAZIL, D. N. P. M. AVULSO NO. 80, RIO, 1956, 30 PP.

MC NEIL, M. BRAZIL'S URANIUM/THORIUM DEPOSITS; GEOLOGY, RESERVES, POTENTIAL. MILLER FREEMAN, SAN FRANCISCO, CALIF., 1978.

MELCHER, G. THE CARBONATITES OF JACUPIRANGA, SAO PAULO BRAZIL. CARBONATITES, TUTTLE & GITTENS, ED., 1966, PP. 169-181.

MELCHER, G. NOTA SOBRE O DISTRITO ALCALINO DE JACUPIRANGA SAO PAULO (BRAZIL). DIV. GEOL. NOTAS PRELIM NO. 84, RIO, 1954, 20 PP.

SERRANA, S A DE MINERACAO. O CARBONATITO APATITICO DE JACUPIRANGA SUA OCCORRENCIA EXTRACAO E EVOLUCAO NO BENEFICIAMENTO INTEGRACAO INDUSTRIAL, SAO PAULO, BRAZIL, 1975.

WORLD MINING. HOW SERRANA MINES AND FLOATS 5.0 PERCENT P205 ORE. JUNE 1977, PP. 42-44.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ANITAPOLIS
SEQUENCE NUMBER: 3510450002

NATION: BRAZIL
SUBDIVISION: SANTA CATARINA
TYPE OF OPERATION: SURFACE
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: S 27 DEG 48 MIN 30 SEC
LONGITUDE: W 49 DEG 06 MIN 00 SEC
UTM - ZONE: 22 HEMISPHERE: SOUTHERN
NORTHING: 6922751 EASTING: 687165
POINT OF REFERENCE: PLANT
PRECISION: 1 KILOMETER
ELEVATION: 850 METERS
PRECISION: 500 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
  CLAIMS

ALTERNATE NAMES
  ALTOS DO RIO PINHEIROS

OWNERSHIP	STATUS
INDUSTRIAS LUCHSINGER MADORIN, SA	OWNER-OPERATOR
FERTISUL, SA	OWNER
PAULO ABIB ENGENHARIA, SA	OWNER
SANTINVEST, SA	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1949

EXPLORATION METHODS
CORE DRILLING/SUBSURFACE GEOLOGICAL MAPPING/TEST PIT/GEOCHEMICAL/RADIOACTIVITY SURVEY

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: DISSEMINATED
MODE OF ORIGIN: MAGMATIC DIFFERENTIATION
SHAPE OF ORE BODY: DOMELIKE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
  AVERAGE DEPTH: 10 METERS
  MINIMUM DEPTH: 0.6 METER

UNCONSOLIDATED MATERIAL:
  AVERAGE THICKNESS: 30 METERS

LITHOLOGY:
  NAME OF FORMATION: ANITAPOLIS COMPLEX
  GEOLOGIC AGE: UPPER CRETACEOUS
  ROCK TYPE:

CARBONATITE	IS ORE; GANGUE
PYROXENITE	ENCLOSES ORE
ALKALIC IGNEOUS	ENCLOSES ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	PHANERITIC-FINE
QUARTZ	FORMS OF SIO2	PHANERITIC-FINE
FELDSPAR	SILICATES	PHANERITIC-FINE
PYROXENE	SILICATES	PHANERITIC-FINE
EPIDOTE	SILICATES	PHANERITIC-FINE
BIOTITE	SILICATES	PHANERITIC-FINE
CALCITE	CARBONATE	PHANERITIC-FINE

BIBLIOGRAPHY RECORDS

AMARAL, G., U. G. CORDANI, K. KAWASHITA, AND J. H. REYNOLDS. POTASSIUM ARGON DATES OF BASALTIC ROCKS FROM SOUTHERN BRAZIL. GEOCHIM ET COSMOCHIM ACTA, VOL. 30, 1966, PP. 159-189.

CARRAR O, C.C., R. S. ISSLER, M. L. L. FORMOSO. MAPEAMENTO DO DISTRICO ALCALINO DE ALTOS DO RIO PINHEIROS, MUNICIPIO DE ANITAPOLIS, ESTADO DE SANTA CATARINA. UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL, PUBLICACAO ESPECIAL, NO. 16, 1967.

FERRAZ, L. US $120 MILHOES EM FOSFORO. GAZETA MERCANTIL, FEBRUARY 19, 1981.

INDUSTRIAS LUCHSINGER MADORIN, S.A. PROJECT ANITAPOLIS, BRAZIL, 1978.

LEONARDOS, OTHON. CARBONATITOS COM APATITA E PIROCLORO. DEPTO. NAC. PROD. MINERAL, AVULSO, NO. 80, ANO 1956.

MORAES REGO, L.F., AND D. GUIMARES. ESTUDOS GEOLOGICOS E PETROGRAFICOS DA JAZIDA DE MAGNETITA DE ANITAPOLIS, ESTADO DE SANTA CATARINA. BRAZIL, DEPT. NAC. PROD. MIN. BOLETIN NO. 21, 1927.

CANADA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CARGILL
SEQUENCE NUMBER: 1220400088

NATION: CANADA
SUBDIVISION: ONTARIO
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 49 DEG 18 MIN 00 SEC
LONGITUDE: W 82 DEG 49 MIN 00 SEC
UTM - ZONE: 17 HEMISPHERE: NORTHERN
NORTHING: 5462174 EASTING: 367923
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 225 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
  LOCATED CLAIM

ALTERNATE NAMES
  CARGILL TOWNSHIP

OWNERSHIP	STATUS
CONTINENTAL COPPER MINES LTD.	OWNER
INTERNATIONAL MINERALS & CHEMICAL CORP. (CANADA)	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
INDICATED	62,500,000	56,700,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1975	1979

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	19.6	WT-PCT
2	P205	20	WT-PCT

PUBLISHED RESERVE-RESOURCE INFORMATION

SOURCE FOR RECORD 1:
SANDVIK, P. O. & G. ERDOSH. GEOLOGY OF THE CARGILL PHOSPHATE DEPOSIT OF NORTHERN ONTARIO. CIM BULLETIN, JANUARY 1977, PP. 90-96.

SOURCE FOR RECORD 2:
ANNIS, R. C., D. A. CRANSTONE, AND M. VALLEE. A SURVEY OF KNOWN MINERAL DEPOSITS IN CANADA THAT ARE NOT BEING MINED. ENERGY MINES AND RESOURCES CANADA, MINERALS, MR 181, 1978, PP. A-27.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1965

---------EXPLORATION METHODS--------
CORE DRILLING/MAGNETIC SURVEY

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: IGNEOUS INTRUSION
MODE OF ORIGIN: CONTACT METASOMATIC
SHAPE OF ORE BODY: MASSIVE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
MINIMUM DEPTH: 85 METERS

LITHOLOGY:
NAME OF FORMATION: CARGILL COMPLEX GEOLOGIC AGE: PRECAMBRIAN
DEFORMATION DESCRIPTION: FAULTING; INTRUSION; MINOR FOLDING
RELATIONSHIP TO MINERALIZATION: COMPLEX
GEOLOGIC AGE: PRECAMBRIAN
ROCK TYPE:

CARBONATITE	IS ORE
QUARTZ DIORITE	LIES ALONG ORE; NEAR ORE
PYROXENITE	LIES ALONG ORE; NEAR ORE
CLAY	LIES OVER ORE; NEAR ORE
SAND	LIES OVER ORE; NEAR ORE
GRAVEL	LIES OVER ORE; NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	VARIABLE
VERMICULITE	FORMS OF SIO2	VARIABLE
MAGNETITE	OXIDES (EXCLUDING SIO2)	VARIABLE

BIBLIOGRAPHY RECORDS

ANNIS, R. C., D. A. CRANSTONE, AND M. VALLEE. A SURVEY OF KNOWN MINERAL DEPOSITS IN CANADA THAT ARE NOT BEING MINED. ENERGY, MINES AND RESOURCES CANADA, MINERALS, MR 181, 1978, PP. A-27.

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

ERDOSH, G. ONTARIO CARBONATITE PROVINCE AND ITS PHOSPHATE POTENTIAL. ECON. GEOL. 1979, PP. 331-338.

ERDOSH, G. AND P. O. SANDVIK. THE APATITE DEPOSIT OF THE CARGILL CARBONATITE COMPLEX (ABSTRACT). 25TH INTERNATIONAL GEOLOGICAL CONGRESS, 1976.

SANDVIK, P. O. AND G. ERDOSH. GEOLOGY OF THE CARGILL PHOSPHATE DEPOSIT OF NORTHERN ONTARIO. CIM BULLETIN, JANUARY 1977, PP. 90-96.

CHINA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FANSHAN

SEQUENCE NUMBER: 5700130041

NATION: CHINA
SUBDIVISION: HOPEH
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 39 DEG 42 MIN 00 SEC
LONGITUDE: E 115 DEG 58 MIN 00 SEC
UTM - ZONE: 50 HEMISPHERE: NORTHERN
NORTHING: 4394761 EASTING: 411406
POINT OF REFERENCE: ORE BODY

YEAR OF INFORMATION: 1981

OWNERSHIP	STATUS
MINISTRY OF CHEMICAL INDUSTRIES (GOVT.)	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1977

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

MODE OF ORIGIN: HYDROTHERMAL
CONTROLLING FEATURES: IGNEOUS

LITHOLOGY:
GEOLOGIC AGE: PRECAMBRIAN
ROCK TYPE:

GRANITE	GANGUE
UNSPECIFIED IGNEOUS	IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION. LONDON, 1980, PP. 185-190.

LEE, ANNABELLE I.N., ED. FERTILIZER OCCURENCES IN THE ASIA-PACIFIC REGION. EAST-WEST RESOURCE SYSTEMS INSTITUTE. HONOLULU, HAWAII, 1980, PP. 106, 129-135.

MINING MAGAZINE. CHINESE PHOSPHATE. (NEWS ITEM RE FANSHAN) MAY 1977.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ZHONGXIANG

SEQUENCE NUMBER: 5700170039

NATION: CHINA
TYPE OF OPERATION: UNDERGROUND
LATITUDE: N 31 DEG 11 MIN 00 SEC
UTM - ZONE: 49 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY

SUBDIVISION: HUPEH
CURRENT STATUS: PRODUCER
LONGITUDE: E 112 DEG 33 MIN 00 SEC
NORTHING: 3450770 EASTING: 647700
PRECISION: 5 KILOMETERS
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
ZHONGXIANG
CHINGXIANG

OWNERSHIP	STATUS
MINISTRY OF CHEMICAL INDUSTRIES (GOVERNMENT)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

YEAR OF INITIAL PRODUCTION: 1963

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: MASSIVE

MINERALIZED ZONE:
AVERAGE THICKNESS: 1.5 METERS

LITHOLOGY:
NAME OF FORMATION: DOUSHANTO (TOWSHANTO) GEOLOGIC AGE: PRECAMBRIAN
ROCK TYPE:

DOLOMITE	NEAR ORE
PHOSPHORITE	IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
DOLOMITE	CARBONATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: INCLINED CUT AND FILL
CAPACITY: 2000 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: CHINA (P. R. OF)
LATITUDE: N 31 11 00 LONGITUDE: E 112 33 00
PERCENT SHIPPED: 100
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: CHINA (P. R. OF)
LATITUDE: N 31 11 00 LONGITUDE: E 112 33 00

BENEFICIATION:
METHOD: SIZING ---------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 2000 ORE/CRUSH/LOADOUT
UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	85	28	WT-PCT

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, LONDON, 1980, PP. 185-190

WANG, K.P. MINERAL RESOURCES AND BASIC INDUSTRIES IN THE PEOPLES' REPUBLIC OF CHINA. WESTVIEW PRESS. BOULDER, COLORADO, 1977, PP. 187-190.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: JINGSHAN
SEQUENCE NUMBER: 5700170040

NATION: CHINA
SUBDIVISION: HUPEH
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 31 DEG 02 MIN 00 SEC
LONGITUDE: E 113 DEG 05 MIN 00 SEC
UTM - ZONE: 49 HEMISPHERE: NORTHERN
NORTHING: 3434976 EASTING: 698843
POINT OF REFERENCE: ORE BODY
PRECISION: 5 KILOMETERS
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
JINGSHAN

OWNERSHIP	STATUS
MINISTRY OF CHEMICAL INDUSTRIES (GOVERNMENT)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

YEAR OF INITIAL PRODUCTION: 1965

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: MASSIVE

MINERALIZED ZONE:
AVERAGE THICKNESS: 1.5 METERS

LITHOLOGY:
NAME OF FORMATION: DOUSHANTO (TOWSHANTO) GEOLOGIC AGE: PRECAMBRIAN
ROCK TYPE:

DOLOMITE	NEAR ORE
PHOSPHORITE	IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
DOLOMITE	CARBONATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: INCLINED CUT AND FILL
CAPACITY: 1300 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE — LOCATION: CHINA (P. R. OF)
LATITUDE: N 31 02 00 — LONGITUDE: E 113 05 00
PERCENT SHIPPED: 100
DESTINATION FACILITY: MILL (ON-SITE) — LOCATION: CHINA (P. R. OF)
LATITUDE: N 31 02 00 — LONGITUDE: E 113 05 00

BENEFICIATION:
METHOD: SIZING — ---------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 1300 — ORE/CRUSH/LOADOUT
UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	85	28	WT-PCT

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, LONDON, 1980, PP. 185-190.

WANG, K. P. MINERAL RESOURCES AND BASIC INDUSTRIES IN THE PEOPLES' REPUBLIC OF CHINA. WESTVIEW PRESS, BOULDER COLORADO, 1977, PP. 187-190.

YEH, LIEN-TSUN, SUN SHU, AND CHIN QI-YAND. UNDATED AND CHARACTERISTICS OF LITHOLOGIC ASSOCIATIONS OF LATE SINIAN AND EARLY CAMBRIAN PHOSPHORITES IN EASTERN CHINA. (SOURCE UNKNOWN- AUTHORS ASSOCIATED WITH INST. GEOL. ACADEMICA SONICA, BEIJING, CHINA). 14 PP. PLUS ILLUS.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: GAIYANG
SEQUENCE NUMBER: 5700330035

NATION: CHINA
SUBDIVISION: KWEICHOW
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 26 DEG 58 MIN 00 SEC
LONGITUDE: E 106 DEG 40 MIN 00 SEC
UTM - ZONE: 48 HEMISPHERE: NORTHERN
NORTHING: 2983667 EASTING: 665424
POINT OF REFERENCE: ORE BODY
PRECISION: 5 KILOMETERS
ELEVATION: 1500 METERS
PRECISION: 500 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP	STATUS
MINISTRY OF CHEMICAL INDUSTRIES (GOVERNMENT)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

YEAR OF INITIAL PRODUCTION: 1964

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: MASSIVE

LITHOLOGY:
NAME OF FORMATION: DOUSHANTO (TOWSHANTO) GEOLOGIC AGE: PRECAMBRIAN
ROCK TYPE:

MUDSTONE	ENCLOSES ORE
SHALE	ENCLOSES ORE
DOLOMITE	NEAR ORE; ENCLOSES ORE
PHOSPHORITE	IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
DOLOMITE	CARBONATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: INCLINED CUT AND FILL
CAPACITY: 6500 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: CHINA (P. R. OF)
LATITUDE: N 26 58 00 LONGITUDE: E 106 40 00
PERCENT SHIPPED: 100
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: CHINA (P. R. OF)
LATITUDE: N 26 58 00 LONGITUDE: E 106 40 00

BENEFICIATION:
METHOD: SIZING ---------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 6500 ORE/CRUSH/LOADOUT
UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	85	35	WT-PCT

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION. LONDON, 1980, PP. 185-190.

CANADIAN MINING JOURNAL. CHINA'S MINERAL INDUSTRY. VOL. 94, NO. 1, JANUARY 1973, 27 PP.

LEE, ANNABELLE I.N., ED. FERTILIZER OCCURRENCES IN THE ASIA-PACIFIC REGION. EAST-WEST RESOURCE SYSTEMS INSITUTE HONOLULU, HAWAII, 1980, PP. 106, 129-135.

WANG, K.P. 1977. MINERAL RESOURCES AND BASIC INDUSTRIES IN THE PEOPLES' REPUBLIC OF CHINA. WESTVIEW PRESS, BOULDER, COLORADO. PP. 187-190

YEH, LIEN-CHUN. THE PHOSPHATE DEPOSITS OF CHINA. IN: PROTEROZORIC-CAMBRIAN PHOSPHORITES, PETER J. COOK AND JOHN H. SHERGOLD, EDITORS. IUGP/IUGS/UNESCO. PROJECT 156, 1978.

YEH, LIEN-TSUN, AND SHU SUN. SALIENT FEATURES OF CHINESE PHOSPHORITE DEPOSITS. PP. 81-92. IN: FERTILIZER MINERAL POTENTIAL IN ASIA AND THE PACIFIC, ED. RICHARD P. SHELDON AND WILLIAM C. BURNETT. EAST-WEST RESOURCE SYSTEMS INSTITUTE, HONOLULU, HAWAII, 1980.

YEH, LIEN-TSUN, SUN SHU, AND CHEN QI-YAND. ORIGIN AND CHARACTERISTICS OF LITHOLOGIC ASSOCIATIONS OF LATE SINIAN AND EARLY CAMBRIAN PHOSPHORITES IN EASTERN CHINA. (SOURCE UNKNOWN - AUTHORS ASSOCIATED WITH INST. GEOL. ACADEMICA SONICA, BEIJING, CHINA). 14 PP. PLUS ILLUS.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: FUZHUAN
SEQUENCE NUMBER: 5700330036

NATION: CHINA
SUBDIVISION: KWEICHOW
TYPE OF OPERATION: SURFACE-UNDERGROUND
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: N 26 DEG 35 MIN 00 SEC
LONGITUDE: E 107 DEG 27 MIN 00 SEC
UTM - ZONE: 48 HEMISPHERE: NORTHERN
NORTHING: 2942457 EASTING: 744016
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
ELEVATION: 1500 METERS
PRECISION: 500 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
FUGUAN

OWNERSHIP	STATUS
MINISTRY OF CHEMICAL INDUSTRIES (GOVERNMENT)	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INFERRED	900,000,000
UNITS	MT ORE
YEAR/DATA	1978

PUBLISHED RESERVE-RESOURCE INFORMATION

RECORD 1: RESERVE GRADE RANGE REPORTED: 25 TO 30 PERCENT P2O5.

SOURCE FOR RECORD 1:
NEW CHINA NEWS AGENCY. NEWS ITEM, RE-PHOSPHATE DEPOSIT AT FUZHUAN. MARCH 18, 1978.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1976

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: MASSIVE

LITHOLOGY:
NAME OF FORMATION: DOUSHANTO (TOWSHANTO) GEOLOGIC AGE: PRECAMBRIAN
ROCK TYPE:

MUDSTONE	ENCLOSES ORE
SHALE	ENCLOSES ORE
DOLOMITE	NEAR ORE; ENCLOSES ORE
PHOSPHORITE	IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
DOLOMITE	CARBONATES

BIBLIOGRAPHY RECORDS

MEW, M. C., ED. WORLD SURVEY OF PHOSPHATE DEPOSITS. BRITISH SULPHUR CORP. LTD. 4TH EDITION, LONDON, 1980, PP. 185-190.

NEW CHINA NEWS AGENCY. NEWS ITEM, RE-PHOSPHATE DEPOSIT AT FUZHUAN. MARCH 18, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SHANDONG
SEQUENCE NUMBER: 5700450024

NATION: CHINA
SUBDIVISION: SHANTUNG
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 36 DEG 00 MIN 00 SEC
LONGITUDE: E 118 DEG 00 MIN 00 SEC
UTM - ZONE: 50 HEMISPHERE: NORTHERN
NORTHING: 3984210 EASTING: 590131
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
YEAR OF INFORMATION: 1981

ALTERNATE NAMES:
SHANDONG
SHANTUNG PROVINCE
SHANDONG PROVINCE

OWNERSHIP	STATUS
MINISTRY OF CHEMICAL INDUSTRIES (GOVERNMENT)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

----------EXPLORATION METHODS----------
TEST PIT

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

MINERALIZED ZONE:
AVERAGE DEPTH: 2 METERS
MINIMUM DEPTH: 1 METER
AVERAGE THICKNESS: 1 METER

LITHOLOGY:
GEOLOGIC AGE: PRECAMBRIAN
ROCK TYPE:
UNSPECIFIED IGNEOUS IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: INCLINED CUT AND FILL
CAPACITY: 6500
UNITS: MT ORE/DAY
ROCK/MINE SUPPORT: TIMBER

TRANSPORTATION (ORE):

ORIGINATING FACILITY: MINE	LOCATION: CHINA (P. R. OF)
LATITUDE: N 36 00 00	LONGITUDE: E 118 00 00
METHOD OF TRANSPORTATION: CARTS	PERCENT SHIPPED: 100
DESTINATION FACILITY: MILL (ON-SITE)	LOCATION: CHINA (P. R. OF)
LATITUDE: N 36 00 00	LONGITUDE: E 118 00 00

BENEFICIATION:

METHOD: SIZING

DESIGN CAPACITY: 6500

UNITS: MT ORE/DAY

----------DESCRIPTION OF MILLING--------
ORE/CRUSH/LOADOUT

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	90	28.0	WT-PCT

BIBLIOGRAPHY RECORDS

BRITISH SULFUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH ED. M.C. MEW, EDITOR. LONDON, 1980, PP. 185-190.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: EMEI
SEQUENCE NUMBER: 5700510041

NATION: CHINA
SUBDIVISION: SZECHUAN
TYPE OF OPERATION: UNKNOWN
CURRENT STATUS: PRODUCER
LATITUDE: N 29 DEG 36 MIN 00 SEC
LONGITUDE: E 103 DEG 31 MIN 00 SEC
UTM - ZONE: 48 HEMISPHERE: NORTHERN
NORTHING: 3275203 EASTING: 356354
POINT OF REFERENCE: ORE BODY
PRECISION: 10 KILOMETERS
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
EMEI

OWNERSHIP	STATUS
MINISTRY OF CHEMICAL INDUSTRIES (GOVERNMENT)	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: MASSIVE

MINERALIZED ZONE:
AVERAGE THICKNESS: 5 METERS

LITHOLOGY:
NAME OF FORMATION: LEI-PO SUITE
GEOLOGIC AGE: LOWER CAMBRIAN
ROCK TYPE:

CHERT	NEAR ORE; GANGUE
LIMESTONE	NEAR ORE; GANGUE
DOLOMITE	NEAR ORE; GANGUE
SANDSTONE	LIES UNDER ORE
DOLOMITE	LIES UNDER ORE
SHALE	NEAR ORE
PHOSPHORITE	IS ORE

MINE/MILL INFORMATION

BENEFICIATION:
METHOD: SIZING
---------- DESCRIPTION OF MILLING -------
PRODUCT
ORE/CRUSH/LOADOUT
PHOSPHATE ROCK

BIBLIOGRAPHY RECORDS

LEE, ANNABELLE I.N., ED. FERTILIZER OCCURENCES IN THE ASIA-PACIFIC REGION. EAST-WEST RESOURCE SYSTEMS INSTITUTE. HONOLULU, HAWAII, 1980, PP. 106, 129-135.

MEW, M. C., ED. WORLD SURVEY OF PHOSPHATE DEPOSITS. BRITISH SULPHUR CORP. LTD., 4TH EDITION, LONDON, 1980, PP. 185-190.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: JIN-HC
SEQUENCE NUMBER: 5700510042

NATION: CHINA
SUBDIVISION: SZECHUAN
TYPE OF OPERATION: UNKNOWN
CURRENT STATUS: PRODUCER
LATITUDE: N 29 DEG 10 MIN 00 SEC
LONGITUDE: E 103 DEG 20 MIN 00 SEC
UTM - ZONE: 48 HEMISPHERE: NORTHERN
NORTHING: 3227423 EASTING: 337912
POINT OF REFERENCE: TOWN
PRECISION: 10 KILOMETERS
ELEVATION: 2000 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP	STATUS
MINISTRY OF CHEMICAL INDUSTRIES (GOVT.)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: MASSIVE
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE THICKNESS: = METERS

LITHOLOGY:
NAME OF FORMATION: LEI-PO SUITE
GEOLOGIC AGE: CAMBRIAN
ROCK TYPE:

CHERT	NEAR ORE; GANGUE
LIMESTONE	NEAR ORE; GANGUE
DOLOMITE	NEAR ORE; GANGUE
SANDSTONE	LIES UNDER ORE
DOLOMITE	LIES UNDER ORE
SHALE	NEAR ORE
PHOSPHORITE	IS ORE

MINE/MILL INFORMATION

BENEFICIATION:
METHOD: SIZING

---------- DESCRIPTION OF MILLING -------
ORE/CRUSH/LOADOUT

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP. LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION. LONDON, 1980, PP. 185-190.

LEE, ANNABELLE I.N., ED. FERTILIZER OCCURENCES IN THE ASIA-PACIFIC REGION. EAST-WEST RESOURCE SYSTEMS INSTITUTE. HONOLULU, HAWAII, 1980, PP. 106, 129-135.

YEH, LIEN-CHUN. THE PHOSPHATE DEPOSITS OF CHINA. IN: PROTEROZOIC-CAMBRIAN PHOSPHORITES, PETER J. COOK AND JOHN H. SHERGOLD, EDITORS. IUGP/IUGS/UNESCO. PROJ. 156, 1978.

YEH, LIEN-TSUN, AND SHU SUN. SALIENT FEATURES OF CHINESE PHOSPHORITE DEPOSITS. PP. 81-92. IN: FERTILIZER MINERAL POTENTIAL IN ASIA AND THE PACIFIC, ED. RICHARD P. SHELDON AND WILLIAM C. BURNETT, EAST-WEST RESOURCE SYSTEMS INSTITUTE, HONOLULU, HAWAII, 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: JINGBING
SEQUENCE NUMBER: 5700510043

NATION: CHINA
SUBDIVISION: SZECHUAN
TYPE OF OPERATION: UNKNOWN
CURRENT STATUS: PRODUCER
LATITUDE: N 28 DEG 19 MIN 00 SEC
LONGITUDE: E 103 DEG 21 MIN 00 SEC
UTM - ZONE: 48 HEMISPHERE: NORTHERN
NORTHING: 3133214 EASTING: 338229
POINT OF REFERENCE: (ORE BODY)
YEAR OF INFORMATION: 1981

OWNERSHIP	STATUS
MINISTRY OF CHEMICAL INDUSTRIES (GOVT.)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
SHAPE OF ORE BODY: MASSIVE
MODE OF ORIGIN: SEDIMENTATION

MINERALIZED ZONE:
AVERAGE THICKNESS: 5 METERS

LITHOLOGY:
NAME OF FORMATION: LEI-PO SUITE
GEOLOGIC AGE: LOWER CAMBRIAN
ROCK TYPE:

CHERT	NEAR ORE; GANGUE
LIMESTONE	NEAR ORE; GANGUE
DOLOMITE	NEAR ORE; GANGUE
SANDSTONE	LIES UNDER ORE
DOLOMITE	LIES UNDER ORE
SHALE	NEAR ORE
PHOSPHORITE	IS ORE

BIBLIOGRAPHY RECORDS

LEE, A. I. N. ED. FERTILIZER OCCURRENCES IN THE ASIA-PACIFIC REGION. EAST-WEST RESOURCE SYSTEMS INSTITUTE. HONOLULU, HAWAII, 1980, PP. 185-190.

MEW, M. C. ED. WORLD SURVEY OF PHOSPHATE DEPOSITS. BRITISH SULFUR CORP., LTD., 4TH ED., LONDON, 1980, PP. 106, 129-135.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: GUNYANG
SEQUENCE NUMBER: 5700570069

NATION: CHINA
SUBDIVISION: YUNNAN
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 24 DEG 30 MIN 00 SEC
LONGITUDE: E 102 DEG 35 MIN 00 SEC
UTM - ZONE: 48 HEMISPHERE: NORTHERN
NORTHING: 2711572 EASTING: 255105
POINT OF REFERENCE: ORE BODY
PRECISION: 5 KILOMETERS
ELEVATION: 2300 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
KUNYAN
JINNING

OWNERSHIP	STATUS
MINISTRY OF CHEMICAL INDUSTRIES (GOVERNMENT)	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1934
YEAR OF INITIAL PRODUCTION: 1966

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: MASSIVE

MINERALIZED ZONE:
AVERAGE LENGTH: 7000 METERS
AVERAGE WIDTH: 1200 METERS

LITHOLOGY:
NAME OF FORMATION: LEI-PO SUITE
GEOLOGIC AGE: LOWER CAMBRIAN
ROCK TYPE:

PHOSPHORITE	IS ORE
DOLOMITE	NEAR ORE; GANGUE
SANDSTONE	LIES UNDER ORE
DOLOMITE	LIES UNDER ORE
SHALE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
DOLOMITE	CARBONATES
FLUORAPATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 4800 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: CHINA (P. R. OF)
LATITUDE: N 24 30 00 LONGITUDE: E 102 35 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: CHINA (P. R. OF)
LATITUDE: N 24 30 00 LONGITUDE: E 102 35 00

BENEFICIATION:
METHOD: SIZING ---------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 4800 ORE/CRUSH/LOADOUT
UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	85	34	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: CHINA (P. R. OF)
LATITUDE: N 24 30 00 LONGITUDE: E 102 35 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: CONVEYOR, RAIL
DESTINATION FACILITY: MARKET LOCATION: CHINA (P. R. OF)

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, LONDON, 1980, PP. 185-190.

CHEN, THEODORE H.E. CHINA PP. 390 D, E, G. IN: WORLD BOOK ENCYCLOPEDIA. VOL. 3, 1976.

LI, TA M., AND K. P. WANG. MINING PHOSPHATES IN YUNNAN - POTENTIAL IS GREAT, BUT SO ARE PROBLEMS. MIN. ENG., MARCH 1980, PP. 287 - 288.

PHOSPHORUS AND POTASSIUM. PEOPLES' REPUBLIC OF CHINA. (NEWS ITEM, RE KUNMING) NO. 107. BRITISH SULPHUR CORP., LTD, 1980.

WANG, K.P. MINERAL RESOURCES AND BASIC INDUSTRIES IN THE PEOPLES' REPUBLIC OF CHINA. WESTVIEW PRESS, BOULDER, COLORADO. 1977, P. 187-190.

WANG, CHUNG-WU. THE CONDITIONS OF FORMATION OF THE LOWER CAMBRIAN PHOSPHORITES AND THE REGULARITIES OF THEIR DISTRIBUTION YUNNAN PROVINCE, CHINA. IN PROTEROZOIC-CAMBRIAN PHOSPHORITES, PETER J. COOK AND JOHN H. SHERGOLD, EDITORS. IUGP/IUGS/UNESCO PROJECT 156, 1978.

YEH, LIEN-CHUN. THE PHOSPHATE DEPOSITS OF CHINA. IN: PROTEROZORIC-CAMERIAN PHOSPHORITES, PETER J. COOK AND JOHN H. SHERGOLD, EDITORS. IUGP/IUGS/UNESCO. PROJECT 156, 1978.

YEH, LIEN-TSUN, AND SHU SUN. SALIENT FEATURES OF CHINESE PHOSPHORITE DEPOSITS. PP. 81-92. IN: FERTILIZER MINERAL POTENTIAL IN ASIA AND THE PACIFIC, ED. RICHARD P. SHELDON AND WILLIAM C. BURNETT. EAST-WEST RESOURCE SYSTEMS INSTITUTE, HONOLULU, HAWAII, 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: GUNMING
SEQUENCE NUMBER: 5700570070

NATION: CHINA
SUBDIVISION: YUNNAN
TYPE OF OPERATION: SURFACE
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: N 24 DEG 55 MIN 00 SEC
LONGITUDE: E 102 DEG 35 MIN 00 SEC
UTM - ZONE: 48 HEMISPHERE: NORTHERN
NORTHING: 2757732 EASTING: 255919
POINT OF REFERENCE: ORE BODY
PRECISION: 5 KILOMETERS
ELEVATION: 2300 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
HAIKOW DEPOSIT

OWNERSHIP	STATUS
MINISTRY OF CHEMICAL INDUSTRIES (GOVERNMENT)	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: MASSIVE
CONTROLLING FEATURES: FOLDING

MINERALIZED ZONE:
AVERAGE DEPTH: 50 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE LENGTH: 2400 METERS
AVERAGE WIDTH: 1600 METERS

LITHOLOGY:
NAME OF FORMATION: LEI-PO SUITE
GEOLOGIC AGE: LOWER CAMBRIAN
ROCK TYPE:

PHOSPHORITE	IS ORE
DOLOMITE	NEAR ORE; GANGUE
SANDSTONE	LIES UNDER ORE
DOLOMITE	LIES UNDER ORE
SHALE	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
DOLOMITE	CARBONATES

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION. LONDON, 1980, PP. 185-190. M.C. MEW, ED.

LI, TA M., AND K.P. WANG. CHINA'S EMERGING MINING INDUSTRY--A LONG MARCH TOWARD MODERNIZATION. MINING ENG. MARCH 1980: 273-290.

PHOSPHORUS AND POTASSIUM. PEOPLE'S REPUBLIC OF CHINA (NEWS ITEM, RE HAIKOW) NO. 99. BRITISH SULPHUR CORP., LTD, 1979.

RULE, ALBERT R. CHARACTERIZATION AND BENEFICIATION STUDIES ON HAIKOW MINE PHOSPHATE ORE. INTERIM REPORT NO. 5, APRIL 1, 1980. U.S.D.I.-BUREAU OF MINES, ALBANY RESEARCH CENTER, ALBANY OREGON, 1980.

SILVA, A. F., JR. BENEFICIATION PROCESS AND ECONOMICS OF THE USE OF LOW GRADE PHOSPHATE ROCK. PAULO ABIB CORP. SAO PAULO, BRAZIL, 1980, 18 P., 4 FIG.

WANG, CHUNG-WU. THE CONDITIONS OF FORMATION OF THE LOWER CAMBRIAN PHOSPHORITES AND THE REGULARITIES OF THEIR DISTRIBUTION YUNNAN PROVINCE, CHINA. IN, PROTEROZORIC-CAMBRIAN PHOSPHORITES, PETER J. COOK AND JOHN H. SHERGOLD, EDITORS. IUGP/IUGS/UNESCO PROJECT 156, 1978.

YEH, LEIN-TSUN, SUN SHU, AND CHIN QI-YAND. ORIGIN AND CHARACTERISTICS OF LITHOLOGIC ASSOCIATIONS OF LATE AND EARLY CAMBRIAN PHORSPHORITES IN EASTERN CHINA. (SOURCE UNKNOWN - AUTHORS ASSOCIATED WITH INST.GEOL. ACADEMICA SONICA, BEIJING, CHINA). 14 P. PLUS. ILLUS.

COLOMBIA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: PESCA
SEQUENCE NUMBER: 3010110001

NATION: COLOMBIA
SUBDIVISION: BOYACA
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: S 05 DEG 38 MIN 00 SEC
LONGITUDE: W 73 DEG 05 MIN 00 SEC
UTM - ZONE: 18 HEMISPHERE: SOUTHERN
NORTHING: 9377018 EASTING: 712295
POINT OF REFERENCE: ORE BODY
PRECISION: 5 KILOMETERS
ELEVATION: 2600 METERS
PRECISION: 500 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
CONEJERA MINE
OCCIDENTE-RIO PESCA

OWNERSHIP
GOVT. OF COLOMBIA (ECOMINAS)

STATUS
OWNER

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
MEASURED	------	22,800,000
INDICATED	------	21,800,000
INFERRED	250,000,000	75,600,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1977	1978

RESERVE-RESOURCE - REMARKS

RECORD 1: ASSAY GRADE NOT AVAILABLE.
RECORD 2: ASSAY GRADE RANGES FROM 8 TO 25 PERCENT P2O5.

SOURCE FOR RECORD 1:
GOMEZ, ALBERTO. ESTUDIO DEL SECTOR FERTILIZANTES EN EL GRUPO ANDINO. REPORTE PRELIMINAR: 1977.

SOURCE FOR RECORD 2:
MOJICA, G., E. PEDRO. FOSFATOS. IN: RECURSOS MINERALES DE COLOMBIA, PULICACIONES GEOLOGICAS ESPECIALES DEL INGEOMINAS.

DEPOSIT HISTORICAL INFORMATION

-------EXPLORATION METHODS-------
CORE DRILLING

YEAR OF DISCOVERY: 1958
YEAR OF INITIAL PRODUCTION: 1981

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR

MINERALIZED ZONE:
MINIMUM DEPTH: 200 METERS AVERAGE THICKNESS: 2.5 METERS
STRIKE/DIP: N90E/18S

LITHOLOGY:
NAME OF FORMATION: PLAENERS FORMATION GEOLOGIC AGE: UPPER CRETACEOUS
DEFORMATION DESCRIPTION: FOLDING
ROCK TYPE:

SANDSTONE LIES	OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE
CLAY	LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	
QUARTZ	SILICATES	
FELDSPAR	SILICATES	PHANERITIC-FINE
MUSCOVITE	SILICATES	PHANERITIC-FINE

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: ROOM AND PILLAR
CAPACITY: 450 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: PESCA MINE, BOYACA
LATITUDE: S 05 38 00 LONGITUDE: W 73 05 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: PESCA MILL, BOYACA
LATITUDE: S 05 38 00 LONGITUDE: W 73 05 00

BENEFICIATION:
METHOD: FLOTATION ---------- DESCRIPTION OF MILLING ---------
DESIGN CAPACITY: 450 ORE/CRUSH/SIZE/WASH/GRIND/DESLIME/FLOTATION/
UNITS: MT ORE/DAY FILTER/DRY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	80	26	WT-PCT

BIBLIOGRAPHY RECORDS

CATHCART, JAMES B. PHOSPHATE FERTILIZER MATERIALS IN COLOMBIA - IMPORTS, USES, AND DOMESTIC SUPPLIES. JOUR. RESEARCH, U.S.G.S., VOL. 3, NO. 6, NOV.-DEC., 1975, P. 659-663.

CATHCART, JAMES B. MINERALOGY, PETROLOGY AND CHEMISTRY OF PHOSPHORITE FROM THE CONEJERA AREA, BOYACA, COLOMBIA. U.S.G.S., 1975, 41P.

ENGINEERING AND MINING JOURNAL. DEC., 1978.

ENGINEERING AND MINING JOURNAL. FEB., 1981.

GOMEZ, A. ESTUDIO DEL SECTOR FERTILIZANTES EN EL GRUPO ANDINO, REPORTE PRELIMINAR. 1977.

JAPAN CONSULTING INSTITUTE. REPORT ON THE PREFEASIBILITY SURVEY OF THE DEVELOPMENT AND UTILIZATION OF PHOSPHATE ROCK IN COLOMBIA.

MC CLELLAN, M. AND J. R. LEHR. CHARACTERISTIC ROCK FROM THE PESCA REGION, COLOMBIA. TVA, MUSCLE SHOALS, ALABAMA, 1972.

MOJICA, G., AND E. PEDRO. FOSFATOS. MINERALES DE COLOMBIA, PULICACIONES GEOLOGICAS ESPECIALES DEL INGEOMINAS, NO. 1, BOGOTA, 1978, P. 237-268.

MOJICA, G., AND E. PEDRO, ET AL. ROCA FOSFORICA EN EL CUADRANGULO J-12, TUNJA. INFORME NO. 1677, BOGOTA, 10/75.

PHOSPHOROUS AND POTASSIUM. JAN/FEB, 1979, P. 11.

RODRIGUEZ, R. ROCA FOSFORICA EN EL CUADRANGULO J-13, SOGOMOSO. INFORME NO. 1676, BOGOTA, D.E., OCTOBER 1975.

ZAMBRANO, O. F. AND G. P. MOJICA. DEPOSITO DE ROCA FOSFORICA DE LA CONEJERA, PESCA, BOYACA. INGEOMINAS, 1973, 15P.

EGYPT

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HAMRAWEIN
SEQUENCE NUMBER: 7290000003

NATION: EGYPT
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 26 DEG 16 MIN 00 SEC
LONGITUDE: E 33 DEG 57 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 2905400 EASTING: 594862
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 500 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP
MISR PHOSPHATE CO.

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INFERRED	400,000,000
UNITS	MT ORE
YEAR/DATA	1977

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
MINING MAGAZINE. AUGUST 1977, P. 147.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1964
YEAR OF INITIAL PRODUCTION: 1978

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: LENTICULAR
CONTROLLING FEATURES: FAULTING

MINERALIZED ZONE:
AVERAGE THICKNESS: 2.5 METERS

LITHOLOGY:
NAME OF FORMATION: BEDS OF MAASTRICHTIAN AGE
GEOLOGIC AGE: UPPER CRETACEOUS
DEFORMATION DESCRIPTION: MAJOR FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDED-DURING DEFORMATION

ROCK TYPE:

LIMESTONE	LIES OVER ORE; LIES UNDER ORE
SHALE	LIES ALONG ORE
PHOSPHORITE	IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
CALCITE	CARBONATES
KAOLINITE	SILICATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: ROOM AND PILLAR
CAPACITY: 900 UNITS: MT ORE/DAY
SHAFTS - NUMBER: 10 AVERAGE DEPTH: 140 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: EGYPT
LATITUDE: N 26 16 00 LONGITUDE: E 33 57 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 15.5
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: EGYPT

BENEFICIATION:
METHOD: PYROMETALLURGY UNSPECIFIED ------ DESCRIPTION OF MILLING -----
DESIGN CAPACITY: 900 ORE/CRUSH/SIZE/WASH/CALCINE/WASH/
UNITS: MT ORE/DAY DRY/SHIP

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	66	33	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: EGYPT
PERCENT SHIPPED: 100
DESTINATION FACILITY: PORT LOCATION: EGYPT

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

DE VOTO, R. H. AND D. M. STEVENS. URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND THE FREE WORLD. EARTH SCIENCES INC, JUNE, 1979.

MINING ANNUAL REVIEW. 1981.

MINING MAGAZINE. AUGUST 1977, P. 147.

WORLD MINING. CATELOG AND DIRECTORY #1980. 1980.

STANFORD RESEARCH INSTITUTE. CHEMICAL ECONOMICS HANDBOOK - PHOSPHATE ROCK. MARCH, 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: QUSEIR
SEQUENCE NUMBER: 7290000004

NATION: EGYPT
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 26 DEG 10 MIN 00 SEC
LONGITUDE: E 34 DEG 20 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 2894661 EASTING: 633257
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

OWNERSHIP
RED SEA PHOSPHATE CO.

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INDICATED	60,000,000
UNITS	MT ORE
YEAR/DATA	1980

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	25	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
STANFORD RESEARCH INSTITUTE. CHEMICAL ECONOMICS HANDBOOK - PHOSPHATE ROCK. MARCH 1980.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1900

GEOLOGICAL AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
AVERAGE THICKNESS: 12.5 METERS

LITHOLOGY:
NAME OF FORMATION: DUWI FORMATION GEOLOGIC AGE: UPPER CRETACEOUS
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
ROCK TYPE:

LIMESTONE	LIES OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE
CLAY	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
CALCITE	CARBONATES
FLINT	FORMS OF SIO2
GYPSUM	SULFATES & CHROMATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: ROOM AND PILLAR

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE — LOCATION: EGYPT
LATITUDE: N 26 10 00 — LONGITUDE: E 34 20 00
PERCENT SHIPPED: 100
DESTINATION FACILITY: MILL (ON-SITE) — LOCATION: EGYPT
LATITUDE: N 26 10 00 — LONGITUDE: E 34 20 00

BENEFICIATION:
METHOD: WASHING

---------- DESCRIPTION OF MILLING -------
WASH/AGITATE/TROMMEL/RAKE CLASSIFY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	70	29.86	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) — LOCATION: EGYPT
LATITUDE: N 26 10 00 — LONGITUDE: E 34 20 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: PORT — LOCATION: QUSEIR,EGYPT

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

STANFORD RESEARCH INSTITUTE. CHEMICAL ECONOMICS HANDBOOK-PHOSPHATE ROCK. MARCH 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SAFAGA
SEQUENCE NUMBER: 7290000005

NATION: EGYPT
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 26 DEG 33 MIN 00 SEC
LONGITUDE: E 33 DEG 55 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 2936756 EASTING: 591310
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 220 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
UM EL HUETAT-GASUS-WASIF-MOHAMMAD RABAH

OWNERSHIP
RED SEA PHOSPHATE COMPANY

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1908
YEAR OF INITIAL PRODUCTION: 1911

-------EXPLORATION METHODS-------
TRENCHING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: BASIN
CONTROLLING FEATURES: FAULTING

MINERALIZED ZONE:
AVERAGE DEPTH: 140 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE THICKNESS: 19.1 METERS

LITHOLOGY:
NAME OF FORMATION: NUBIAN SANDSTONE
GEOLOGIC AGE: UPPER CRETACEOUS
DEFORMATION DESCRIPTION: FAULTING; MINOR FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
ROCK TYPE:

SANDSTONE	LIES UNDER ORE
LIMESTONE	LIES OVER ORE
PHOSPHORITE	IS ORE
CHERT	LIES OVER ORE; LIES UNDER ORE
SHALE	LIES ALONG ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
KAOLINITE	SILICATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: ROOM AND PILLAR
CAPACITY: 322 UNITS: MT ORE/DAY
ROCK AND WATER CONDITIONS:
HARDROCK WITH LITTLE WATER
SHAFTS - NUMBER: 4 AVERAGE DEPTH: 140 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: EGYPT
LATITUDE: N 26 33 00 LONGITUDE: E 33 55 00
METHOD OF TRANSPORTATION: CONVEYOR PERCENT SHIPPED: 100
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: EGYPT
LATITUDE: N 26 33 00 LONGITUDE: E 33 55 00

BENEFICIATION:
METHOD: SIZING ---------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 300 ORE/DRY/SCREEN/CRUSH/SHIP
UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	99	30.13	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: EGYPT
LATITUDE: N 26 33 00 LONGITUDE: E 33 55 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 27
DESTINATION FACILITY: PORT LOCATION: EGYPT

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. 3RD WORLD SURVEY. 1973.

BRITISH SULPHUR CORP., LTD. 4TH WORLD SURVEY. 1980.

HUME, W. F. THE PHOSPHATE DEPOSITS OF EGYPT. LES RESERVES MONDIALES EN PHOSPHATES. 14TH INT. GEOL. CONGRESS 1926, MADRID, 1928.

EL-TARABILI, EL-SAYAD. PALEOGEOGRAPHY, PALEOECOLOGY AND GENESIS OF THE PHOSPHATIC SEDIMENTS IN THE QUSEIR-SAFAGA AREA, U A R. ECON. GEOLOGY, VOL 64, 1969, PP. 172-182.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ABU TARTUR
SEQUENCE NUMBER: 7290000009

NATION: EGYPT
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: N 25 DEG 26 MIN 00 SEC
LONGITUDE: E 30 DEG 02 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 2816091 EASTING: 201602
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 550 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
AGREEMENT WITH GOVERNMENT

OWNERSHIP
ARAB REPUBLIC OF EGYPT

STATUS
OWNER

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INDICATED	325,000,000
INFERRED	383,000,000
UNITS	MT ORE
YEAR/DATA	1977

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	25.6	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
GEOLOGICAL SURVEY OF EGYPT. ANNAIS. VOL. VII, 1977.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1898

-------EXPLORATION METHODS-------
DRILLING/TRENCHING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR

MINERALIZED ZONE:
AVERAGE DEPTH: 150 METERS
AVERAGE THICKNESS: 9 METERS
MINIMUM DEPTH: 0 METERS

LITHOLOGY:
NAME OF FORMATION: DUWI FORMATION GEOLOGIC AGE: UPPER CRETACEOUS
DEFORMATION DESCRIPTION: FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
ROCK TYPE:

SHALE	LIES OVER ORE; LIES UNDER ORE
LIMESTONE	LIES OVER ORE
PHOSPHORITE	IS ORE
SANDSTONE	LIES OVER ORE; LIES UNDER ORE
SILTSTONE	LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
PYRITE	SULFIDES
CALCITE	CARBONATES
DOLOMITE	CARBONATES
KAOLINITE	SILICATES

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

DE VOTO, R. H. AND STEVENS, D. N. URANIFEROUS PHOSPHATE RESOURCES, UNITED STATES AND THE FREE WORLD. U S, U S DEPARTMENT OF ENERGY CONTRACT, GRAND JUNCTION, GJBX-110 (79), 1979, P. 375-378.

ENGINEERING AND MINING JOURNAL. MAJOR DEPOSITS OF PHOSPHATE FOUND BY OCCIDENTAL. E&MJ, JULY 1980, P. 159.

MINING ANNUAL REVIEW. EGYPT, MINERAL PRODUCTION. 1980, P 543.

PHOSPHORUS AND POTASSIUM. INVESTIGATION OF EGYPT'S ABU TARTUR PHOSPHATE DEPOSIT. NO. 109, SEPTEMBER/OCTOBER, 1980, P. 32-39.

SAID, R., ED. THE GEOLOGICAL AND ECONOMIC EVALUATION OF ABU TARTUR PHOSPHORITE DEPOSIT, WESTERN DESERT, EGYPT. EGYPT, GEOL. SURV. ANN. (EGY) VOL. 7, 1977, P. 130.

USSR. STATE INSTITUTE OF MINING CHEMISTRY. GORCHIMPROJECT, FEASIBILITY REPORT ON DEVELOPING THE PHOSPHORITE DEPOSIT OF ABU TARTUR IN THE A R E. MOSCOW, 1974.

USSR. STATE DESIGN INSTITUTE FOR MINING CHEMISTRY INDUSTRY. SUPPLEMENT TO THE FEASIBILITY REPORT ON EXPLOITATION OF ABU TARTUR PHOSPHATE DEPOSIT IN A R E. MOSCOW, 1975.

U. S. BUREAU OF MINES. MINERALS YEARBOOK. WORLD REVIEW 1978-79.

ZAGHLOUL, Z. M., AND B. MABROUK. ON URANIUM IN DAKHLA AND MAHAMID PHOSPHATE DEPOSITS. JOURNAL OF GEOLOGY, U A R, VOL 8, NO 2, 1964, P 79-87.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SEBAIYA WEST
SEQUENCE NUMBER: 7290000010

NATION: EGYPT
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 25 DEG 10 MIN 00 SEC
LONGITUDE: E 32 DEG 40 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 2783285 EASTING: 466408
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 50 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
EL MAHAMID

OWNERSHIP
ABU ZAABAL FERTILIZER & CHEMICAL CO

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
-------EXPLORATION METHODS-------
DRILLING/TEST PIT
YEAR OF DISCOVERY: 1870
YEAR OF INITIAL PRODUCTION: 1908

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: MASSIVE
CONTROLLING FEATURES: FOLDING

MINERALIZED ZONE:
AVERAGE DEPTH: 8 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE THICKNESS: 2.5 METERS
STRIKE/DIP: N45W/01W

LITHOLOGY:
GEOLOGIC AGE: UPPER CRETACEOUS
DEFORMATION DESCRIPTION: MINOR FOLDING; FAULTING
ROCK TYPE:

GRAVEL	LIES OVER ORE
SAND	LIES OVER ORE
CLAY	LIES OVER ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
CALCITE	CARBONATES
KAOLINITE	SILICATES

MINE/MILL INFORMATION

SURFACE MINING:
- METHOD: STRIPPING
- CAPACITY: 2100 UNITS: MT ORE/DAY
- DESCRIPTION OF COVER:
  - SAND, GRAVEL
- AVERAGE COVER THICKNESS: 8 METERS

TRANSPORTATION (ORE):
- ORIGINATING FACILITY: MINE LOCATION: EGYPT
- LATITUDE: N 25 10 00 LONGITUDE: E 32 40 00
- PERCENT SHIPPED: 100
- METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 5
- DESTINATION FACILITY: MILL (ON-SITE) LOCATION: EGYPT
- LATITUDE: N 25 10 00 LONGITUDE: E 32 40 00

BENEFICIATION:
- METHOD: FLOTATION
- DESIGN CAPACITY: 2100
- UNITS: MT ORE/DAY

--------- DESCRIPTION OF MILLING -------
ORE/CRUSH/SIZE/GRIND/FLOAT/SHIP

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	70	28	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
- ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: EGYPT
- LATITUDE: N 25 10 00 LONGITUDE: E 32 40 00
- PERCENT SHIPPED: 100
- METHOD OF TRANSPORTATION: RIVER DISTANCE (KM): 500
- DESTINATION FACILITY: REFINERY LOCATION: EGYPT

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY, 4TH ED. 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: QENA
SEQUENCE NUMBER: 7290000012

NATION: EGYPT
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 26 DEG 10 MIN 00 SEC
LONGITUDE: E 32 DEG 52 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 2893984 EASTING: 486674
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 250 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
NILE VALLEY

OWNERSHIP
ARAB REPUBLIC OF EGYPT

STATUS
OWNER

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
UNDIFFERENTIATED	1,500,000,000
UNITS	MT ORE
YEAR/DATA	1978

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	25.5	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
MINING MAGAZINE. EGYPTIAN EXPLORATION. JAN. 1978.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1975

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

LITHOLOGY:
NAME OF FORMATION: MIDDLE PHOSPHATE GROUP GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES ABOVE ORE; LIES BELOW ORE
SHALE	LIES ABOVE ORE; LIES BELOW ORE

LITHOLOGY:
NAME OF FORMATION: UPPER PHOSPHATE GROUP GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES ABOVE ORE; LIES BELOW ORE
SHALE	LIES ABOVE ORE; LIES BELOW ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
FLUORAPATITE	PHOSPHATES	PHANERITIC-FINE
PYRITE	SULFIDES	PHANERITIC-FINE
QUARTZ	FORMS OF SIO2	
CALCITE	CARBONATES	

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. WORLD SURVEY #4. 1980.

EL-KAMMAR, A.M., A. ZAYED AND S. A. AMER. RARE EARTHS OF THE NILE VALLEY PHOSPHORITES, UPPER EGYPT. CHEMICAL GEOLOGY, V. 24 1979, PP. 69-81.

MINING MAGAZINE. EGYPTIAN EXPLORATION. JAN. 1978.

FINLAND

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SIILINJARVI
SEQUENCE NUMBER: 4050250003

NATION: FINLAND
SUBDIVISION: KUOPIO
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 63 DEG 05 MIN 12 SEC
LONGITUDE: E 27 DEG 42 MIN 46 SEC
UTM - ZONE: 35 HEMISPHERE: NORTHERN
NORTHING: 6995246 EASTING: 535997
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 100 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
CONCESSIONS

OWNERSHIP		STATUS
KEMIRA OY (GOVT.)		OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
CALCIUM	CALCITE	BYPRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
INDICATED	500,000,000	465,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1981	1980

IN SITU GRADE:

RECORD	ASSAY FORM
1	P2O5
	CACO3

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
CHADWICK, J. R. HOW SIILINJARVI SUCCESSFULLY FLOATS LOW-GRADE APATITE. WORLD MINING, JUNE, 1981, PP. 106-109.

SOURCE FOR RECORD 2:
BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980, PP. 224-225.

DEPOSIT HISTORICAL INFORMATION

----------EXPLORATION METHODS----------
DRILLING/GRAVITATIONAL SURVEY/
SURFACE GEOLOGICAL MAPPING

YEAR OF DISCOVERY: 1954
YEAR OF INITIAL PRODUCTION: 1980

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

MODE OF ORIGIN: HYDROTHERMAL
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
AVERAGE DEPTH: 5 METERS MINIMUM DEPTH: 0 METERS
AVERAGE LENGTH: 3500 METERS AVERAGE WIDTH: 600 METERS
AVERAGE THICKNESS: 150 METERS

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 5 METERS

LITHOLOGY:
NAME OF FORMATION: SIILINJARVI COMPLEX
GEOLOGIC AGE: PRECAMBRIAN
ROCK TYPE:
CARBONATITE IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
CALCITE	CARBONATES
DOLOMITE	CARBONATES
PHLOGOPITE	SILICATES
FLUORAPATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: BENCH (BERM)
CAPACITY: 7600 UNITS: MT ORE/DAY
PERCENT WASTE ROCK: 10.0 AVERAGE COVER THICKNESS: 5 METERS
BENCH HEIGHT: 12 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: FINLAND
LATITUDE: N 63 05 12 LONGITUDE: E 27 42 46
METHOD OF TRANSPORTATION: TRUCK PERCENT SHIPPED: 100
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: FINLAND
LATITUDE: N 63 05 12 LONGITUDE: E 27 42 46

BENEFICIATION:
METHOD: FLOTATION ----------DESCRIPTION OF MILLING-------
DESIGN CAPACITY: 7600 ORE/CRUSH/STOCK/GRIND/CLASSIFY/
UNITS: MT ORE/DAY FLOTATION/THICKEN/FILTER

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	87	35.9	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: FINLAND
LATITUDE: N 63 05 12 LONGITUDE: E 27 42 46
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 70
DESTINATION FACILITY: PORT

BIBLIOGRAPHY RECORDS

CANADIAN MINING JOURNAL. FINNS TO PRODUCE FERTILIZER FROM LOW-GRADE APATITE ORE. 9/79, PP.77-78.

PHOSPHORUS AND POTASSIUM. KEMIRA EXPLOITS LOW-GRADE PHOSPHATE DEPOSITS AT SIILINJARVI. NO. 108, JULY/AUGUST, 1980.

PHOSPHORUS AND POTASSIUM. KEMIRA OY. NO. 111, JAN/FEB, 1981.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980, PP. 224-225.

CHADWICK, J. R. HOW SIILINJARVI SUCCESSFULLY FLOATS LOW-GRADE APATITE. WORLD MINING, 6/80, PP. 106-109.

JOHANNESSEN, THOR./WERNER. THE CLIMATE OF SCANDINAVIA. IN, CLIMATES OF NORTHERN AND WESTERN EUROPE OF WORLD SURVEY OF CLIMATOLOGY, VOL. 5, NEW YORK, 1970.

KIUKKOLA, KALEVI. APATITE FROM LOW-GRADE ORE. LAROX NEWS, NO. 2, 2/79.

KIUKKOLA, KALEVI. SELECTIVE FLOTATION OF APATITE FROM LOW-GRADE PHOSPHORUS ORE CONTAINING CALCITE, DOLOMITE AND PHLOGOPITE. REPRINT FROM BULL. GEOL. SOC. FINLAND (N.D).

OJAKANGAS, RICHARD W. PETROGRAPHY AND SEDIMENTATION OF THE PRE-CAMBRIAN JATULIAN QUARTZITES OF FINLAND. BULL. DE LA COMMISSION GEOLOGIQUE DE FINLANDE, NO.214, OTANIEMI, 1965, P. 74.

PUUSTINEN, KAUKO. GEOLOGY OF THE SIILINJARVI CARBONATITE COMPLEX IN EASTERN FINLAND. BULL. DE LA COMMISSION GEOLOGIQUE DE FINLANDE, NO. 249, OTANIEMI, 1971, P. 43.

WHITE, LANE. FINNS CONTINUE CONTRIBUTIONS TO ADVANCING WORLD MINING AND PROCESSING TECHNOLOGY. E. & M. J., 2/77, P.65-68.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SOKLI
SEQUENCE NUMBER: 4050350002

NATION: FINLAND
SUBDIVISION: LAPPI
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 67 DEG 45 MIN 00 SEC
LONGITUDE: E 29 DEG 15 MIN 00 SEC
UTM - ZONE: 35 HEMISPHERE: NORTHERN
NORTHING: 7516535 EASTING: 595061
POINT OF REFERENCE: ORE BODY
PRECISION: 5 KILOMETERS
ELEVATION: 220 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDINGS
CONCESSIONS

OWNERSHIP
RAUTARUUKKI OY (GOVERNMENT)

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	50,000,000
INDICATED	75,000,000
UNITS	MT ORE
YEAR/DATA	1979

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	19	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
NOTHOLT, A. G. THE ECONOMIC GEOLOGY & DEVELOPMENT OF INGEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE USSR. ECON. GEOL., VOL. 74(2), 1979, PP. 339-350.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
AIRBORNE GEOPHYSICAL SURVEY
YEAR OF DISCOVERY: 1967

EXPLORATION METHODS
AIRBORNE GEOPHYSICAL SURVEY/SURFACE GEOLOGICAL MAPPING/TEST PIT/DRILLING/GRAVITATIONAL SURVEY

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

MODE OF ORIGIN: HYDROTHERMAL
SHAPE OF ORE BODY: MASSIVE

MINERALIZED ZONE:
AVERAGE DEPTH: 5 METERS
MINIMUM DEPTH: 1 METER
AVERAGE THICKNESS: 25 METERS

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 5 METERS
MINIMUM THICKNESS: 1 METER

LITHOLOGY:
NAME OF FORMATION: SOKLI COMPLEX GEOLOGIC AGE: PALEOZOIC
ROCK TYPE:
CARBONATITE IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
MICA	SILICATES
MAGNETITE	OXIDES (EXCLUDING SIO2)
CALCITE	CARBONATES
PYROCHLORE	OXIDES (EXCLUDING SIO2)
FLUORAPATITE	PHOSPHATES

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980, PP. 224-225.

ENGINEERING AND MINING JOURNAL. PHOSPHATE. JANUARY 1979, P. 110.

INDUSTRIAL MINERALS. FINLAND. PHOSPHATE PROGRESS. JANUARY 1977, PP. 10-11.

JOHANNESSEN, T. W. THE CLIMATE OF SCANDINVIA. IN, CLIMATES OF NORTHERN AND WESTERN EUROPE OF WORLD SURVEY OF CLIMATES, NEW YORK, VOL. 5, 1970.

MINING MAGAZINE. EUROPE. FINLAND. JANUARY 1979, P. 71.

NORTHOLT, A. G. THE ECONOMIC GEOLOGY AND DEVELOPMENT OF INGEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE USSR; ECON. GEOL., VOL. 74 (2), 1979, PP. 339-350.

PAARMA, H. A NEW FIND OF CARBONATITE IN NORTH FINLAND, THE SOKLI PLUG IN SAVUKOSKI. LITHOS NO. 3, APRIL 1970, PP.129-133.

PHOSPHORUS AND POTASSIUM. RAUTARUUKKI OY NEARS DECISION TIME AT SOKLI. NO. 102, JULY/ AUGUST, 1979.

RUSSELL, B. G., THE POSSIBLE RECOVERY DURING THE MANUFACTURE OF PHOSPHORIC ACID OF RARE EARTHS FROM FOSKOR CONCENTRATE. SOUTH AFRICAN MINERALS BUREAU, BULLETIN NO.1, (N.D.).

WHITE, L. FINNS CONTINUE CONTRIBUTIONS TO ADVANCING WORLD MINING AND PROCESSING TECHNOLOGY. E. & M.J., FEBRUARY 1977, PP. 65-68.

INDIA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: JHAMARKOTRA
SEQUENCE NUMBER: 5330410047

NATION: INDIA
SUBDIVISION: RAJASTHAN
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 24 DEG 28 MIN 00 SEC
LONGITUDE: E 73 DEG 50 MIN 00 SEC
UTM - ZONE: 43 HEMISPHERE: NORTHERN
NORTHING: 2706238 EASTING: 381761
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 520 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP	STATUS
RAJASTHAN STATE MINES AND MINERALS, LTD. (INDIA GOVT).	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	64,000,000
UNITS	MT ORE
YEAR/DATA	1981

RESERVE-RESOURCE - REMARKS

RECORD 1: GRADE RANGES FROM 18 TO 30 PERCENT P205.

SOURCES FOR RECORD 1:
RAHASTHAN STATE MINES AND MINERALS. L.T.D. A BRIEF INTRODUCTION. UDAIPUR, 1981.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
----------EXPLORATION METHODS---------
TEST PIT/TRENCHING/DRILLING
YEAR OF DISCOVERY: 1968
YEAR OF INITIAL PRODUCTION: 1970

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: LENTICULAR; IRREGULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 24 METERS — MINIMUM DEPTH: 0 METERS
AVERAGE LENGTH: 16000 METERS — AVERAGE THICKNESS: 6 METERS
STRIKE/DIP: S65E/45N

LITHOLOGY:
GEOLOGIC AGE: PRECAMBRIAN
ROCK TYPE:

PHOSPHORITE	IS ORE
DOLOMITE	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIP-HILLSIDE
CAPACITY: 1900 — UNITS: MT ORE/DAY
DESCRIPTION OF COVER:
MEDIUM-HARD ROCKS
AVERAGE COVER THICKNESS: 24 METERS — PERCENT WASTE ROCK: 80.0

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE — LOCATION: RAJASTHAN, INDIA
LATITUDE: N 24 28 00 — LONGITUDE: E 73 50 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK — DISTANCE (KM): 2
DESTINATION FACILITY: MILL (ON-SITE) — LOCATION: RAJASTHAN, INDIA
LATITUDE: N 24 28 00 — LONGITUDE: E 73 50 00

BENEFICIATION:
METHOD: SIZING
DESIGN CAPACITY: 1900
UNITS: MT ORE/DAY
---------- DESCRIPTION OF MILLING -------
ORE/CRUSH/LOADOUT

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	95	30.0	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) — LOCATION: RAJASTHAN, INDIA
LATITUDE: N 24 28 00 — LONGITUDE: E 73 35 00
PERCENT SHIPPED: 100
DESTINATION FACILITY: FOB MILL

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, LONDON, 1980.

THE FERTILIZER ASSOCIATION OF INDIA. FERTILIZER STATISTICS 1979-1980; NEW DELHI.

LEHR, J. R. CHARACTERIZATION OF PHOSPHATE ROCKS FROM UDAIPUR, INDIA. TENNESSEE VALLEY AUTHORITY, JULY 22, 1969.

PHOSPHORUS AND POTASSIUM. THE DEPOSITS NEAR UDAIPUR - SOURCE OF INDIA'S FUTURE PHOSPHATE SUPPLIES. 44, NOV/DEC. 1969.

RAHASTHAN STATE MINES AND MINERALS LTD. A GLIMPSE ON JHAMARKOTRA ROCK PHOSPHATE MINING PROJECT. UDAIPUR C.1979.

RAHASTHAN STATE MINES AND MINERALS, LTD. A BRIEF INTRODUCTION. UDAIPUR, 1981.

IRAQ

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: AKASHAT
SEQUENCE NUMBER: 5050000002

NATION: IRAQ
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: N 34 DEG 00 MIN 00 SEC
LONGITUDE: E 40 DEG 25 MIN 00 SEC
UTM - ZONE: 37 HEMISPHERE: NORTHERN
NORTHING: 3762866 EASTING: 630191
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 350 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
GOVERNMENT CONTROLLED

OWNERSHIP
STATE ORGANIZATION FOR MINERALS

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	450,000,000
UNITS	MT ORE
YEAR/DATA	1981

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	21.04	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
ARAB FEDERATION OF CHEMICAL FERTILIZER PRODUCERS. QUARTERLY JOURNAL. ISSUE #1, THIRD YEAR, MARCH 1981.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOPHYSICAL ANOMALY
YEAR OF DISCOVERY: 1955

----------EXPLORATION METHODS----------
RADIOACTIVITY SURVEY/
SUBSURFACE GEOLOGICAL MAPPING/CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY

MINERALIZED ZONE:
  MINIMUM DEPTH: 0 METERS STRIKE/DIP: N90E/01N
  AVERAGE THICKNESS: 10.5 METERS

LITHOLOGY:
  NAME OF FORMATION: TAYARAT FORMATION GEOLOGIC AGE: UPPER CRETACEOUS
  DEFORMATION DESCRIPTION: NO DEFORMATION
  ROCK TYPE:
    PHOSPHORITE IS ORE
    LIMESTONE LIES OVER ORE; LIES UNDER ORE

LITHOLOGY:
  NAME OF FORMATION: UM-ER-RADKUMA FORMATION GEOLOGIC AGE: PALEOCENE
  DEFORMATION DESCRIPTION: NO DEFORMATION
  ROCK TYPE:
    PHOSPHORITE IS ORE
    LIMESTONE LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
CALCITE	CARBONATES
DOLOMITE	CARBONATES
QUARTZ	FORMS OF SIO2
FRANCOLITE	PHOSPHATE

MINE/MILL INFORMATION

SURFACE MINING:
  METHOD: STRIPPING
  CAPACITY: 10300 UNITS: MT ORE/DAY
  DESCRIPTION OF COVER:
    HARD ROCKS
  AVERAGE COVER THICKNESS: 10.5 METERS PERCENT WASTE ROCK: 50.0

TRANSPORTATION (ORE):
  ORIGINATING FACILITY: MINE LOCATION: IRAQ
  LATITUDE: N 34 00 00 LONGITUDE: E 40 25 00
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: TRUCK; RAIL DISTANCE (KM): 1; 150
  DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: IRAQ
  LATITUDE: N 34 25 00 LONGITUDE: E 41 12 00

BENEFICIATION:
  METHOD: TEMPERATURE DECOMPOSITION ----DESCRIPTION OF MILLING----
  DESIGN CAPACITY: 10300 ORE/CRUSH/CALCINE/COOLED/SLURRY
  UNITS: MT ORE/DAY CYCLONE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
CONCENTRATE	P2O5	75	31.75	WT-PCT

BIBLIOGRAPHY RECORDS

ARAB FEDERATION OF CHEMICAL FERTILIZER PRODUCERS. QUARTERLY JOURNAL. ISSUE #1, THIRD YEAR, MARCH 1981.

BASSAM, A.L. MINERALOGY, GEOCHEMISTRY AND GENESIS OF THE AKASHAT PHOSPHATE DEPOSIT. J. GEOL. SOC., IRAQ, VIX, PP. 1-33, 1976.

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. FOURTH EDITION, 1980.

MINING JOURNAL. METHODS AND MACHINES. JUNE 3,1977

ISRAEL

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ARAD
SEQUENCE NUMBER: 5080000001

NATION: ISRAEL
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 31 DEG 07 MIN 00 SEC
LONGITUDE: E 35 DEG 12 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 3444429 EASTING: 709797
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 150 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
MINERALS ONLY

ALTERNATE NAMES
ZEFA E*FE MINERAL DEPOSITS

OWNERSHIP
NEGEV PHOSPHATES LTD

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1930
YEAR OF INITIAL PRODUCTION: 1970

-----EXPLORATION METHODS------
BEDROCK SAMPLING/CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

MINERALIZED ZONE:
AVERAGE DEPTH: 18 METERS
AVERAGE THICKNESS: 10.2 METERS

MINIMUM DEPTH: 5 METERS

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 18 METERS

MINIMUM THICKNESS: 5 METERS

LITHOLOGY:
NAME OF FORMATION: MISHASH GEOLOGIC AGE: UPPER CRETACEOUS
DEFORMATION DESCRIPTION: MINOR FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:
PHOSPHORITE IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
CALCITE	CARBONATES
QUARTZ	FORMS OF SIO2
OPAL	FORMS OF SIO2
DOLOMITE	CARBONATES
GYPSUM	SULFATES & CHROMATES
FRANCOLITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
CAPACITY: 2200 UNITS: MT ORE/DAY
DESCRIPTION OF COVER:
SAND, SILT
AVERAGE COVER THICKNESS: 18 METERS PERCENT WASTE ROCK: 77.8

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: ISRAEL
LATITUDE: N 31 07 00 LONGITUDE: E 35 12 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 6.0
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: ISRAEL
LATITUDE: N 31 05 00 LONGITUDE: E 35 11 00

BENEFICIATION:
METHOD: WASHING ----------DESCRIPTION OF MILLING--------
DESIGN CAPACITY: 2100 CRUSH/SCREEN/CYCLONE/DRY
UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
CONCENTRATE	P2O5	64	33.2	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE CONCENTRATE
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: ISRAEL
LATITUDE: N 31 05 00 LONGITUDE: E 35 11 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 152
DESTINATION FACILITY: PORT LOCATION: ISRAEL

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATES. 4TH EDITION, PART 4, MIDDLE EAST, ASIA AND OCEANIA, 1980, P. 161-164

INTERNATIONAL URANIUM RESOURCES EVALUATION PROGRAM (IUREP). NO. 139, ISRAEL, AIEA, VIENNA, 1980.

PHOSPHORUS & POTASSIUM. ISRAEL. NO. 94, MARCH/APRIL, 1978.

PHOSPHORUS & POTASSIUM. NEGEV PHOSPHATES COME OF AGE. NO. 107, MAY/JUNE, 1980, PP. 27-32.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ORON
SEQUENCE NUMBER: 5080000005

NATION: ISRAEL
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 30 DEG 52 MIN 00 SEC
LONGITUDE: E 34 DEG 59 MIN 00 SEC
UTM ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 3416326 EASTING: 689626
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 250 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
MINERALS ONLY

OWNERSHIP
NEGEV PHOSPHATES LTD.

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE
URANIUM

MARKETABILITY
PRIMARY PRODUCT
RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1950
YEAR OF INITIAL PRODUCTION: 1952

----------EXPLORATION METHODS----------
BEDROCK SAMPLING/CORE DRILLING/DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY

MINERALIZED ZONE:
AVERAGE DEPTH: 12.4 METERS
MINIMUM DEPTH: 7 METERS
AVERAGE THICKNESS: 5.7 METERS

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 12.4 METERS
MINIMUM THICKNESS: 7 METERS

LITHOLOGY:
NAME OF FORMATION: MISHASH FORMATION GEOLOGIC AGE: UPPER CRETACEOUS
DEFORMATION DESCRIPTION: MINOR FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	LIES OVER ORE; LIES UNDER ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
CHERT	SILICATES
CALCITE	CARBONATES
FRANCOLITE	PHOSPHATES

SURFACE MINING:
METHOD: STRIPPING
CAPACITY: 4000 UNITS: MT ORE/DAY
DESCRIPTION OF COVER: HARDNESS OF ORE:
SAND, SILT SAND, SILT
AVERAGE COVER THICKNESS: 12.4 METERS PERCENT WASTE ROCK: 72.0

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: ISRAEL
LATITUDE: N 30 52 00 LONGITUDE: E 34 59 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 5.0
DESTINATION FACILITY: MILL LOCATION: ISRAEL
LATITUDE: N 30 55 00 LONGITUDE: E 35 01 00

BENEFICIATION:
METHOD: WASHING ---------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 4000 ORE/CRUSH/SCREEN/WASH/DESLIME/WASH/FILTER/
UNITS: MT ORE/DAY DRY/LOADOUT

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE CONCENTRATE	P205	58	34.3	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPATE CONCENTRATE
ORIGINATING FACILITY: MILL LOCATION: ISRAEL
LATITUDE: N 30 55 00 LONGITUDE: E 35 01 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 175
DESTINATION FACILITY: PORT LOCATION: ISRAEL

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. SURVEY OF WORLD PHOSPHATES. 4TH EDITION, 1980, PP. 162-163.

ENGINEERING AND MINING JOURNAL. NEVEG PHOSPHATES. MARCH 1981

INTERNATIONAL URANIUM RESOURCES EVALUATION PROGRAM (IUREP). NO. 139, AIEA, VIENNA, 1930.

PHOSPHORUS & POTASSIUM. NEGEV PHOSPHATES COME OF AGE. NO. 107., MAY/JUNE 1980.

PHOSPHORUS & POTASSIUM. ROCK LOADER FOR ASHDOD. NO. 104, NOV/DEC 1979.

WORLD MINING. ISRAEL. CAT. & DIR. NO., 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NAHAL ZIN
SEQUENCE NUMBER: 5080000006

NATION: ISRAEL
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 30 DEG 51 MIN 00 SEC
LONGITUDE: E 35 DEG 06 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 3414682 EASTING: 700817
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 150 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
MINERALS ONLY

OWNERSHIP
NEGEV PHOSPHATES LTD.

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1930
YEAR OF INITIAL PRODUCTION: 1978

------EXPLORATION METHODS------
BEDROCK SAMPLING/CORE DRILLING/
DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY

MINERALIZED ZONE:
AVERAGE DEPTH: 1.5 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE THICKNESS: 8.52 METERS

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 1.5 METERS

LITHOLOGY:
NAME OF FORMATION: MISHASH FORMATION GEOLOGIC AGE: UPPER CRETACEOUS
DEFORMATION DESCRIPTION: MINOR FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
SHALE	LIES OVER ORE; LIES UNDER ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
CHERT	SILICATES
CALCITE	CARBONATES
FRANCOLITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
CAPACITY: 15900 UNITS: MT ORE/DAY
DESCRIPTION OF COVER: HARDNESS OF ORE:
SAND, SILT SAND, SILT
AVERAGE COVER THICKNESS: 1.5 METERS PERCENT WASTE ROCK: 78.5

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: ISRAEL
LATITUDE: N 30 51 00 LONGITUDE: E 35 06 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 3.0
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: ISRAEL
LATITUDE: N 30 51 00 LONGITUDE: E 35 06 00

BENEFICIATION:
METHOD: WASHING -------DESCRIPTION OF MILLING-------
DESIGN CAPACITY: 15200 ORE/CRUSH/SCREEN/WASH/DESLIME/
UNITS: MT ORE/DAY WASH/FILTER/DRY/LOADOUT

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
CONCENTRATE	P205	48	32.0	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPATE CONC
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: ISRAEL
LATITUDE: N 30 51 00 LONGITUDE: E 35 06 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 205
DESTINATION FACILITY: PORT LOCATION: ISRAEL

BIBLIOGRAPHY RECORDS

DEVOTO, R. H, AND D. N. STEVENS. URANIFEROUS PHOSPHATE DEPOSITS OF THE FREE WORLD. U.S. DEPT. ENERGY CONTRACT, GRAND JUNCTION, GJBX 110 (79), 1979, P. 386-390.

ENGINEERING AND MINING JOURNAL. PHOSPHATES. JANUARY, 1979.

INTERNATIONAL URANIUM RESOURCES EVALUATION PROGRAM (IUREP). NO. 139, ISRAEL, AIEA, VIENNA, 1980.

KETZINEL, Z. URANIUM SOURCES, PRODUCTION AND DEMAND IN ISRAEL. IN, URANIUM AND THORIUM RESOURCES, VOL. 8, U.N. INT'L CONF. PEACEFUL USES OF ATOMIC ENERGY, GENEVA, 1972, PP. 113-119.

MINERALS YEARBOOK. ISRAEL. WORLD REVIEW 1978-79.

NATHAN, Y. AND Y. SHILONI. EXPLORATION FOR URANIUM IN PHOSPHORITES: A NEW STUDY ON URANIUM IN ISRAEL PHOSPHORITES. IN: EXPLORATION FOR URANIUM ORE DEPOSITS: IAEA, VIENNA, PP. 645-655, 1976.

PHOSPHORUS & POTASSIUM. NEGEV PHOSPHATES COME OF AGE. NO. 107, MAY/JUNE, 1980, P. 27-32

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: EIN YAHAV
SEQUENCE NUMBER: 5080000007

NATION: ISRAEL
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 30 DEG 37 MIN 00 SEC
LONGITUDE: E 35 DEG 11 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 3388969 EASTING: 709292
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 68 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
  EXPLORATION PERMITS

ALTERNATE NAMES
  EIN YUHAN

OWNERSHIP
  ULTRAMAR MINERALS CORPORATION

STATUS
  OWNER-OPERATOR

COMMODITY
  PHOSPHATE
  URANIUM

MARKETABILITY
  PRIMARY PRODUCT
  PHOSPHATE

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1957

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY; FOLDING

MINERALIZED ZONE:
  AVERAGE DEPTH: 20 METERS
  AVERAGE THICKNESS: 11 METERS
  STRIKE: N45E

UNCONSOLIDATED MATERIAL:
  AVERAGE THICKNESS: 20 METERS

LITHOLOGY:
NAME OF FORMATION: MISHASH GEOLOGIC AGE: LOWER CRETACEOUS
DEFORMATION DESCRIPTION: MINOR FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
UNSPECIFIED SEDIMENTARY	LIES OVER ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FRANCOLITE	PHOSPHATE

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. THIRD EDITION, 1971.

INTERNATIONAL URANIUM EVALUATION PROGRAM (IUREP). ISRAEL. NO. 139, VIENNA, 1980.

JORDAN

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: EL HASA/ EL ABIAD
SEQUENCE NUMBER: 5110000005

NATION: JORDAN
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 30 DEG 49 MIN 00 SEC
LONGITUDE: E 36 DEG 00 MIN 00 SEC
UTM - ZONE: 37 HEMISPHERE: NORTHERN
NORTHING: 3412952 EASTING: 212986
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 800 METERS
PRECISION: 500 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
  PRIVATE LEASE; CONCESSIONS

ALTERNATE NAMES
  EL ABIAD
  EL ABIUTH
  WADI EL ABIYAO
  WADI EL ABIUTH
  EL HASA
  EL HASSA
  GATRANA

OWNERSHIP
  JORDAN PHOSPHATE MINES CO, S.A.

STATUS
  OWNER-OPERATOR

COMMODITY
  PHOSPHATE
  URANIUM

MARKETABILITY
  PRIMARY PRODUCT
  RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
MEASURED	178,060,000	------
INDICATED	22,540,000	------
INFERRED	------	342,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1981	1980

RESERVE-RESOURCE REMARKS

SOURCE FOR RECORD 1:
MINING MAGAZINE. JORDON MINES PHOSPHATE. MAY 1981, PP. 376-389.

SOURCE FOR RECORD 2:
ARAB FEDERATION CHEMICAL FERTILIZATION PRODUCERS. QUARTERLY JOURNAL, ISSUE 4, SECOND YEAR, DECEMBER 1980.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1903

------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: DISSEMINATED; SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: LENTICULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

MINERALIZED ZONE:
AVERAGE DEPTH: 23 METERS MINIMUM DEPTH: 7 METERS
AVERAGE THICKNESS: 5 METERS

LITHOLOGY:
NAME OF FORMATION: MIDDLE BELGA SERIES GEOLOGIC AGE: UPPER CRETACEOUS
ROCK TYPE:

PHOSPHORITE	IS ORE
CHERT	LIES OVER ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
CALCITE	CARBONATES
QUARTZ	FORMS OF SIO2

MINE/MILL INFORMATION

EL HASA & EL ABIAD STATS COMBINED

SURFACE MINING:
METHOD: STRIPPING
CAPACITY: 21600 UNITS: MT ORE/DAY
DESCRIPTION OF COVER:
MEDIUM HARD ROCKS
AVERAGE COVER THICKNESS: 23 METERS PERCENT WASTE ROCK: 82.0

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: JORDAN
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 5
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: JORDAN

BENEFICIATION:
METHOD: WASHING --------DESCRIPTION OF MILLING-------
DESIGN CAPACITY: 21600 WASHING/CRUSHING/DESLIMING/FILTERING/
UNITS: MT ORE/DAY DRYING

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
CONCENTRATE	P2O5	70	33.7	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE CONCENTRATE
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: JORDAN
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 228
DESTINATION FACILITY: PORT LOCATION: JORDAN

BIBLIOGRAPHY RECORDS

ARAB FEDERATION CHEMICAL FERTILIZATION PRODUCERS. QUARTERLY JOURNAL, ISSUE 4, SECOND YEAR, DECEMBER 1980.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

COPPENS, R., S. BASHIR, AND P. RICHARD. RADIOACTIVITY OF EL HASA PHOSPHATES, A PRELIMINARY STUDY. MINERALIUM DEPOSITA, VOL. 12, 1977, PP. 189-196.

EARTH SCIENCES, INC. URANIFEROUS PHOSPHATE RESOURCES OF THE FREE WORLD. U.S. DEPT. ENERGY, CONTRACT GJBX 110-79, GRAND JUNCTION, 1979, PP. 60-62.

ENGINEERING AND MINING JOURNAL. JORDAN PREPARED FOR MAJOR PHOSPHATE BOOM. VOL 166, NO. 7, JULY 1965.

JONES, G. K. THE INDUSTRIAL MINERALS OF JORDAN. INDUSTRIAL MINERALS, JAN. 1980.

MINING MAGAZINE. JORDON MINES PHOSPHATE. MAY 1981, PP. 376-389.

PHOSPHOROUS & POTASSIUM. THE JORDANIAN PHOSPHATE MINING INDUSTRY, RECENT DEVELOPMENTS AT EL HASA AND FUTURE PLANS. NO. 34, MARCH/APRIL, 1968.

REEVES, J. J. AND T. A. K. SAADI. FACTORS CONTROLLING THE DEPOSITION OF SOME PHOSPHATE BEARING STRATA FROM JORDAN. ECON. GEOL., VOL. 66, 1971, PP. 451-465.

WORLD MINING. EL HASA AND ABIAD. OCT. 1979

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: RUSEIFA
SEQUENCE NUMBER: 5110000006

NATION: JORDAN
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 32 DEG 00 MIN 00 SEC
LONGITUDE: E 36 DEG 02 MIN 00 SEC
UTM - ZONE: 37 HEMISPHERE: NORTHERN
NORTHING: 3544095 EASTING: 219721
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 800 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING:
GOVERNMENT CONTROLLED

OWNERSHIP
JORDON PHOSPHATE MINING CO.

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE
URANIUM

MARKETABILITY
PRIMARY PRODUCT
RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
MEASURED	67,000,000	------
INDICATED	11,500,000	------
INFERRED	------	39,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1981	1974

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
MINING MAGAZINE. JORDON MINES PHOSPHATE. MAY 1981, PP 376-386.

SOURCE FOR RECORD 2:
WORLD BANK. 1974.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1903
YEAR OF INITIAL PRODUCTION: 1934

--------EXPLORATION METHODS--------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

MINERALIZED ZONE:
  AVERAGE DEPTH: 16.5 METERS MINIMUM DEPTH: 15 METERS
  AVERAGE THICKNESS: 6 METERS

UNCONSOLIDATED MATERIAL:
  AVERAGE THICKNESS: 16.5 METERS MINIMUM THICKNESS: 15 METERS

LITHOLOGY:
  NAME OF FORMATION: MIDDLE BELGA SERIES GEOLOGIC AGE: UPPER CRETACEOUS
  DEFORMATION DESCRIPTION: NO DEFORMATION
  ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE
CHERT	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
CALCITE	CARBONATES
GYPSUM	SULFATES & CHROMATES
QUARTZ	FORMS OF SIO2
FRANCOLITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
  METHOD: STRIPPING
  CAPACITY: 3700 UNITS: MT ORE/DAY
  DESCRIPTION OF COVER:
    SAND, SILT
  AVERAGE COVER THICKNESS: 16.5 METERS PERCENT WASTE ROCK: 73.0

TRANSPORTATION (ORE):
  ORIGINATING FACILITY: MINE LOCATION: JORDAN
  LATITUDE: N 32 00 00 LONGITUDE: E 36 02 00
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 5.0
  DESTINATION FACILITY: MILL (ON-SITE) LOCATION: JORDAN

BENEFICIATION:
  METHOD: WASHING ----------DESCRIPTION OF MILLING ---------
  DESIGN CAPACITY: 3700 ORE/CRUSH/SCREENED/DESLIMED/FILTERED/DRIED
  UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
CONCENTRATE	P205	75	30.7	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE CONCENTRATE
  ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: JORDAN
  PERCENT SHIPPED: 100
  DESTINATION FACILITY: PORT LOCATION: JORDAN

BIBLIOGRAPHY RECORDS

ABU HASSAN, A. PHOSPHATE ROCK IN JORDAN. ISMA EAST REGIONAL MEETING ON RAW MATERIALS, KUWAIT, FEBRUARY 17-19, 1981.

AFCFP QUARTERLY JOURNAL. ISSUE 4, SECOND YEAR, DECEMBER 1980

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

EARTH SCIENCES, INC. URANIFEROUS PHOSPHATE RESOURCES OF THE FREE WORLD. U.S. DEPT. ENERGY, CONTRACT GJBX 110-79, GRAND JUNCTION 1979, P. 60-62.

JONES, G.K. THE INDUSTRIAL MINERALS OF JORDAN. INDUSTRIAL MINERALS, JANUARY 1980

MINING MAGAZINE. JORDAN MINES PHOSPHATE. MAY 1981, P. 376-38

REEVES, J. J., AND T. A. K. SAADI. FACTORS CONTROLLING THE DEPOSITION OF SOME PHOSPHATE BEARING STRATA FROM JORDAN. ECON. GEOL., VOL. 66, 1971, PP. 451-465.

RUGG, E.S. JORDAN PREPARES FOR MAJOR PHOSPHATE BOOM. E. & M.J., VOL.166, NO. 7, JULY 1965

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: ESH-SHIDIYAH
SEQUENCE NUMBER: 5110000007

NATION: JORDAN
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 29 DEG 40 MIN 00 SEC
LONGITUDE: E 36 DEG 00 MIN 00 SEC
UTM - ZONE: 37 HEMISPHERE: NORTHERN
NORTHING: 3285436 EASTING: 209620
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 900 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING:
PRIVATE LEASE

OWNERSHIP
JORDON PHOSPHATE MINES CO. S.A.

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
MEASURED	790,000,000	300,000,000
INDICATED	133,000,000	200,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1981	1976

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
2 (MEASURED)	P205	25.2	WT-PCT
2 (INDICATED)	P205	24.8	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
MINING MAGAZINE. JORDAN MINES PHOSPHATE. MAY 1981, PP. 376-389.

SOURCE FOR RECORD 2:
JONES, G. K. THE INDUSTRIAL MATERIALS OF JORDAN. INDUSTRIAL MINERALS, JANUARY 1980.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1978

-------EXPLORATION METHODS-------
CORE DRILLING/TEST PIT

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: LENTICULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

MINERALIZED ZONE:
AVERAGE DEPTH: 40 METERS AVERAGE THICKNESS: 8 METERS

LITHOLOGY:
NAME OF FORMATION: MIDDLE BELGA SERIES GEOLOGIC AGE: UPPER CRETACEOUS
DEFORMATION DESCRIPTION: NO DEFORMATION
ROCK TYPE:

LIMESTONE	LIES OVER ORE
PHOSPHORITE	IS ORE
SANDSTONE	LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
QUARTZ	FORMS OF SIO2
CALCITE	CARBONATES
CHALCEDONY	FORMS OF SIO2
FRANCOLITE	PHOSPHATE

BIBLIOGRAPHY RECORDS

ABU HASSAN, A. PHOSPHATE ROCK IN JORDAN. ISMA, MIDDLE EAST REGIONAL MEETING ON RAW MATERIALS. KUWAIT, FEBRUARY 17- 19, 1981.

AFCFP QUARTERLY JOURNAL. ISSUE 4, SECOND YEAR, DECEMBER 1980.

EARTH SCIENCES, INC. URANIFEROUS PHOSPHATE RESOURCES OF THE FREE WORLD. U.S. DEPT. ENERGY CONTRACT GJBX 110-79, GRAND JUNCTION 1979, P. 60-62

JONES, G.K., THE INDUSTRIAL MATERIALS OF JORDAN. INDUSTRIAL MINERALS, JANUARY 1980.

MINERALS YEARBOOK, JORDAN. PRODUCTION FROM THE RUSEIFA MINES. 1978-1979.

MINING MAGAZINE. JORDAN PHOSPHATES. JANUARY 1979, P. 83.

REEVES, J. J., AND T. A. K. SAADI. FACTORS CONTROLLING THE DEPOSITION OF SOME PHOSPHATE BEARING STRATA FROM JORDAN. ECON. GEOL., VOL. 66, 1971, PP. 451-465.

RUGG, E. S. JORDAN PREPARES FOR MAJOR PHOSPHATE BOOM. E.& M.J., VOL.166, NO. 7, JULY 1965

MEXICO

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SANTA DOMINGO
SEQUENCE NUMBER: 2010000018

NATION: MEXICO
TYPE OF OPERATION: SURFACE
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: N 24 DEG 17 MIN 24 SEC
LONGITUDE: W 111 DEG 00 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 2686179 EASTING: 500000
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 19 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP
ROCA FOSFORICA MEXICANA S. A. (ROFOMEX) - GOVT.

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	1,100,000,000
UNITS	MT ORE
YEAR/DATA	1981

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	4.5	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
HARRIS, R. ROFOMEX MOVES MEXICO TOWARD PHOSPHATE SELF-SUFFICIENCY. ENG. AND MIN. J., V. 182, JULY 1981, PP. 54-58.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1950

-------EXPLORATION METHODS-------
WATER JET DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: PLACER; SEDIMENTARY
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 0 METERS
AVERAGE THICKNESS: 18 METERS

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 0 METERS

LITHOLOGY:
NAME OF FORMATION: SOLEDAD GEOLOGIC AGE: RECENT
DEFORMATION DESCRIPTION: NO DEFORMATION
ROCK TYPE:
SAND NEAR ORE; IS ORE
CLAY NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
FRANCOLITE	PHOSPHATES	VARIABLE
QUARTZ	FORMS OF SIO2	VARIABLE
FELDSPAR	SILICATES	VARIABLE
MAGNETITE	OXIDES (EXCLUDE SIO2	VARIABLE
ILMENITE	MULTIPLE OXIDES CONTAINING NB, TA, TI	VARIABLE
ZIRCON	SILICATES	VARIABLE

BIBLIOGRAPHY RECORDS

ANGLEJAN-CHATILLON, B.F. THE MARINE PHOSPHORITE DEPOSIT OF BAJA CALIFORNIA, MEXICO: PRESENT ENVIRONMENT AND RECENT HISTORY. DISSERTATION, UNIVERSITY OF CALIFORNIA, SAN DIEGO, 1965, 195P.

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

CLARKE, GERRY. MEXICAN PHOSPHATE - A STRIVE FOR SELF-SUFFICIENCY. INDUSTRIAL MINERALS, MAY, 1980, P. 79-91.

DEVOTO, R. H. URANIFEROUS PHOSPHATE DEPOSITS. VOL. 1, GJBX-110(79), GRAND JUNCTION, 1979, P. 63-66.

EMERY, K. O. AND R. S. DIETZ. SUBMARINE PHOSPHORITE DEPOSITS OFF CALIFORNIA AND MEXICO. CALIF. DIV. MINES AND GEOL., VOL. 46, 1950, P. 7-15.

HARRIS, R. ROFOMEX MOVES MEXICO TOWARD PHOSPHATE SELF-SUFFICIENCY. E&MJ, V. 182, JULY 1981, PP. 54-58.

PHLEGER, F. B. AND G. C. EWING. SEDIMENTOLOGY AND OCEANOGRAPHY OF COASTAL LAGOONS IN BAJA CALIFORNIA, MEXICO. G.S.A., BULL. VOL. 73, 1962, P. 145-182.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SAN HILARIO
SEQUENCE NUMBER: 2010050003

NATION: MEXICO
SUBDIVISION: BAJA CALIFORNIA SUR
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 24 DEG 25 MIN 00 SEC
LONGITUDE: W 111 DEG 30 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 2700295 EASTING: 449308
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 200 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP
ROCO FOSFORICA MEXICANA S. A. (ROFOMEX) - GOVT.

STATUS
OWNER

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3	RECORD 4
UNDIFFERENTIATED	72,547,000	167,424,000	123,116,000	97,251,000
UNITS	MT ORE	MT ORE	MT ORE	MT ORE
YEAR/DATA	1980	1980	1980	1980

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	17.89	WT-PCT
2	P205	13.17	WT-PCT
3	P205	14.03	WT-PCT
4	P205	11.06	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: ZONA NORTE RESERVES - HORIZONTE "A" AND 80 METERS OVERBURDEN
RECORD 2: ZONA NORTE RESERVES - CAPA INDICE+ AND 80 METERS OVERBURDEN
RECORD 3: ZONA SUR RESERVES - HORIZ. SUPERIOR AND 80 METERS OVERBURDEN
RECORD 4: ZONA SUR RESERVES - CAPA INDICE AND 80 METERS OVERBURDEN

SOURCE FOR ALL RECORDS:
CLARKE, GERRY. MEXICAN PHOSPHATE - A STRIVE FOR SELF-SUFFICIENCY. INDUSTRIAL MINERALS NO. 152, MAY 1980, PP. 79-86.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1974

-------EXPLORATION METHODS--------
DRILLING/AERIAL RADIOMETRIC SURVEY

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
STRIKE/DIP: N32W/04E

LITHOLOGY:
NAME OF FORMATION: MONTERREY GEOLOGIC AGE: MIOCENE
DEFORMATION DESCRIPTION: MINOR FOLDING; FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING, DURING, AND FOLLOWING DEFORMATION
GEOLOGIC AGE: PLIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SANDSTONE	LIES OVER ORE; LIES UNDER ORE
SHALE	LIES OVER ORE; LIES UNDER ORE
SILTSTONE	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
QUARTZ	FORMS OF SIO2
DIATOMITE	SILICATES

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. 1980.

CLARKE, C. MEXICAN PHOSPHATE - A STRIVE FOR SELF-SUFFICIENCY. INDUSTRIAL MINERALS NO. 152, MAY 1980,PP.79-86.

GONZALES, C. GARCIA. MEXICAN PROJECTS FOR PRODUCTION OF PHOSPHATE ROCK IN LOWER CALIFORNIA. 1980.

RIVERA, JESUS OJEDA. GENERAL GEOLOGY AND PHOSPHATE DEPOSITS OF SOUTHERN BAJA CALIFORNIA. MEXICO, 1981.

RIVERA, J. L. RESUMEN DE DATOS ESTRATIGRAFICOS Y ESTRUCTUR-ALES DE LA FORMACION MONTERREY QUE AFLORA EN EL AREA DE SAN HILARIO, BAJA CALIFORNIA SUR (SUMMARY OF THE STRATIGRAPHIC AND STRUCTURAL DATA ON THE MONTERREY FORMATION WHICH OUTCROPS IN THE SAN HILARIO AREA, BAJA CALIFORNIA (SUR). CONSEJO DE RECURSOS MINERALES (MINERAL RESOURCES COUNCIL), MEXICO, 1979.

ENGINEERING AND MINING JOURNAL. ROFOMEX, MOVES MEXICO TOWARD PHOSPHATE SELF-SUFFICENCY. JULY 1981.

SALAS, G.P. SEDIMENTARY PHOSPHATE DEPOSIT IN BAJA CALIFORNIA, MEXICO. AIME 78-H-75, MARCH 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SAN JUAN DE LA COSTA
SEQUENCE NUMBER: 2010050015

NATION: MEXICO
SUBDIVISION: BAJA CALIFORNIA SUR
TYPE OF OPERATION: SURFACE-UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 24 DEG 22 MIN 00 SEC
LONGITUDE: W 110 DEG 53 MIN 00 SEC
UTM - ZONE: 12 HEMISPHERE: NORTHERN
NORTHING: 2694672 EASTING: 511832
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 40 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP
ROCA FOSFORICA MEXICANA, S. A. (ROFOMEX) - GOVT.

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	50,000,000
UNITS	MT ORE
YEAR/DATA	1980

RESERVE-RESOURCE - REMARKS

RECORD 1: AVERAGE GRADE REPORTED AS 18-20 PERCENT P205.

SOURCE FOR RECORD 1:
CLARKE, G. MEXICAN PHOSPHATE - A STRIVE FOR SELF-SUFFICIENCY. INDUSTRIAL MINERALS NO. 152, PP. 79-85, MAY 1980.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOPHYSICAL ANOMALY
YEAR OF DISCOVERY: 1976
YEAR OF INITIAL PRODUCTION: 1980

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE THICKNESS: 3.7 METERS

LITHOLOGY:
NAME OF FORMATION: MONTEREY GEOLOGIC AGE: MIOCENE
DEFORMATION DESCRIPTION: MINOR FOLDING; FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING, DURING, AND FOLLOWING DEFORMATION

GEOLOGIC AGE: MIOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
SANDSTONE	LIES OVER ORE; LIES UNDER ORE
SHALE	LIES OVER ORE; LIES UNDER ORE
SILTSTONE	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
QUARTZ	FORMS OF SIO2
DIATOMITE	SILICATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 2700 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: MEXICO
LATITUDE: N 24 22 00 LONGITUDE: W 110 53 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 2.5
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: MEXICO
LATITUDE: N 24 22 00 LONGITUDE: W 110 53 00

UNDERGROUND MINING:
METHOD: ROOM AND PILLAR
CAPACITY: 2300 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: MEXICO
LATITUDE: N 24 22 00 LONGITUDE: W 110 53 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 2.5
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: MEXICO
LATITUDE: N 24 22 00 LONGITUDE: W 110 53 00

BENEFICIATION:
METHOD: FLOTATION ------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 5000 ORE/STOCKPILE/CRUSH/WET STORAGE/SCREEN/
UNITS: MT ORE/DAY FLOAT/FILTER/WASH/SOLAR-DRY/STOCKPILE/SHIP

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	67	31	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: MEXICO
LATITUDE: N 24 22 00 LONGITUDE: W 110 53 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: OCEAN
DESTINATION FACILITY: MARKET LOCATION: MEXICO

BIBLIOGRAPHY RECORDS

CLARKE, C. MEXICAN PHOSPHATE - A STRIVE FOR SELF-SUFFICIENCY. INDUSTRIAL MINERALS NO. 152, PP. 79-85, MAY 1980.

GONZALEZ, C. G. MEXICAN PROJECTS FOR THE PRODUCTION OF PHOSPHATE ROCK IN LOWER CALIFORNIA. 1980.

PHOSPHORUS & POTASSIUM. MEXICO - PHOSPHATE ROCK PRODUCER OF THE FUTURE. NO. 109, PP. 20-24, SEPT./OCT. 1980.

RIVERA, J. O. GENERAL GEOLOGY AND PHOSPHATE DEPOSITS OF SOUTHERN BAJA CALIFORNIA, MEXICO. 1981.

SALAS, G. P. SEDIMENTARY PHOSPHATE DEPOSITS IN BAJA CALIFORNIA, MEXICO. AIME 78-H-75, MARCH 1978.

MOROCCO

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MERAA EL ARECH

SEQUENCE NUMBER: 7140150001

NATION: MOROCCO
TYPE OF OPERATION: SURFACE
LATITUDE: N 32 DEG 40 MIN 00 SEC
UTM - ZONE: 29 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY

SUBDIVISION: KHOURIBGA
CURRENT STATUS: PRODUCER
LONGITUDE: W 06 DEG 47 MIN 30 SEC
NORTHING: 3616299 EASTING: 707091
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDINGS
GOVERNMENT GRANT

ALTERNATE NAMES
SIDI EL MAATI
MERAA EL ARECH (NORD)
MERAA EL ARECH (SUD)
SIDI MAATI

OWNERSHIP	STATUS
OFFICE CHERIFIEN DES PHOSPHATES (GOVT.) - OCP	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1919
YEAR OF INITIAL PRODUCTION: 1965

----------EXPLORATION METHODS--------
SURFACE GEOLOGICAL MAPPING/DRILLING/
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 30.1 METERS
AVERAGE THICKNESS: 7.15 METERS
MINIMUM DEPTH: 15 METERS

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE
CHERT	LIES OVER ORE: LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
CAPACITY: 14500 UNITS: MT ORE/DAY
AVERAGE COVER THICKNESS: 30.1 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: MOROCCO
LATITUDE: N 32 40 00 LONGITUDE: W 06 47 30
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK; CONVEYOR DISTANCE (KM): 5; 10
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: MOROCCO
LATITUDE: N 32 46 00 LONGITUDE: W 06 47 30

BENEFICIATION:
METHOD: SIZING -------DESCRIPTION OF MILLING-------
DESIGN CAPACITY: 14500 ORE/CRUSH/SCREEN/DRY
UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	52	32.1	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: MOROCCO
LATITUDE: N 32 46 00 LONGITUDE: W 06 47 30
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 149
DESTINATION FACILITY: PORT LOCATION: CASABLANCA, MOROCCO

BIBLIOGRAPHY RECORDS

DEVOTO, R.H. AND D. N. STEVENS. URANIFEROUS PHOSPHATE RESOURCES OF THE FREE WORLD. U.S. DEPT. ENERGY CONTRACT, GJBX-110 (79), 1979, P. 401-404.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DAOUI-RECETTE 4
SEQUENCE NUMBER: 7140150002

NATION: MOROCCO
SUBDIVISION: KHOURIBGA
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 32 DEG 47 MIN 00 SEC
LONGITUDE: W 06 DEG 40 MIN 00 SEC
UTM - ZONE: 29 HEMISPHERE: NORTHERN
NORTHING: 3629487 EASTING: 718531
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
GOVERNMENT GRANT

ALTERNATE NAMES
DAOUI OPEN CAST MINE
RECETTE 4
DAOUI MINE
GRAND DAOUI
DAOUI SUD
DAOUI CENTRAL
DAOUI

OWNERSHIP	STATUS
OFFICE CHERIFIEN DES PHOSPHATES (GOVT.)-OCP	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1919
YEAR OF INITIAL PRODUCTION: 1971

-------EXPLORATION METHODS-----
SURFACE GEOLOGICAL MAPPING/
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

MINERALIZED ZONE:
AVERAGE DEPTH: 25 METERS
AVERAGE THICKNESS: 12 METERS

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE
CHERT	LIES OVER ORE: LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
CAPACITY: 53000 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: MOROCCO
LATITUDE: N 32 47 00 LONGITUDE: W 06 40 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK; CONVEYOR DISTANCE (KM): 5; 5
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: MOROCCO
LATITUDE: N 32 47 00 LONGITUDE: W 06 40 00

BENEFICIATION:
METHOD: WASHING -------DESCRIPTION OF MILLING-------
DESIGN CAPACITY: 53000 ORE/SCREEN/CRUSH/WASH/DRY/SHIP
UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	54	32.1	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: MOROCCO
LATITUDE: N 32 47 00 LONGITUDE: W 06 40 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 149
DESTINATION FACILITY: PORT LOCATION: CASABLANCA, MOROCCO

BIBLIOGRAPHY RECORDS

DEVOTO, R. H. AND D. N. STEVENS. URANIFEROUS PHOSPHATE RESOURCES OF THE FREE WORLD. U.S. DEPT. ENERGY CONTRACT, GJBX-110 (79), 1979, P. 401-404.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: KHOURIBGA UNDERGROUND
SEQUENCE NUMBER: 7140150003

NATION: MORROCCO
SUBDIVISION: KHOURIBGA
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 32 DEG 48 MIN 00 SEC
LONGITUDE: W 06 DEG 54 MIN 00 SEC
UTM - ZONE: 29 HEMISPHERE: NORTHERN
NORTHING: 3630877 EASTING: 696637
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 800 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDINGS
GOVERNMENT GRANT

ALTERNATE NAMES
KHOURIBGA COMPLEX
RECETTE 2
RECETTE 7
RECETTE 8
RECETTE 9
RECETTE 10
KHOURIBGA, MORROCCO, UNDERGROUND MINE

OWNERSHIP
OFFICE CHERIFIEN DES PHOSPHATES (GOVT.)-OCP

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

-------EXPLORATION METHODS-------
DRILLING/CORE DRILLING/
BEDROCK SAMPLING

YEAR OF DISCOVERY: 1919

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

MINERALIZED ZONE:
AVERAGE THICKNESS: 4.2 METERS

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

LIMESTONE	LIES OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE
CHERT	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
CALCITE	CARBONATES
QUARTZ	FORMS OF SIO2

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: ROOM AND PILLAR
CAPACITY: 15500 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: MOROCCO
LATITUDE: N 32 48 00 LONGITUDE: W 06 54 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: CONVEYOR DISTANCE (KM): 6
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: MOROCCO
LATITUDE: N 32 48 00 LONGITUDE: W 06 54 00

BENEFICIATION:
METHOD: SIZING -------- DESCRIPTION OF MILLING -----
DESIGN CAPACITY: 15500 ORE/2 STAGE SCREEN/CALCINE/DRY/SCREEN
UNITS: MT ORE/DAY /STOCKPILE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	67	32.3	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: MOROCCO
LATITUDE: N 32 48 00 LONGITUDE: W 06 54 00
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 134
DESTINATION FACILITY: PORT LOCATION: MOROCCO

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. THIRD EDITION, 1971, PP. 101-106.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980, PP. 42-48.

ENGINEERING & MINING JOURNAL. MOROCCO. PRODUCTION OF PHOSPHATE ROCK..., JULY 1980, V. 181, NO. 7, P. 160.

INTERNATIONAL URANIUM RESOURCES EVALUATION PROGRAM (IUREP). MORROCO. NO. 14, JUNE 1977.

MINING MAGAZINE. PHOSPHATE IN MOROCCO. VOL. 120, NO. 6, JUNE 1969, PP. 394-396.

PHOSPHORUS & POTASSIUM. FURTHER DETAILS OF OCP'S PLANS FOR THE FUTURE. POTASSIUM, NO. 112, 1981, PP. 18-21.

PHOSPHORUS & POTASSIUM. OCP UNVEILS ITS PLANS FOR THE 1980S, PT. I & II. NOS. 105 & 106, 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SIDI HAJJAJ
SEQUENCE NUMBER: 7140150004

NATION: MOROCCO
SUBDIVISION: KHOURIBGA
TYPE OF OPERATION: SURFACE
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: N 32 DEG 56 MIN 00 SEC
LONGITUDE: W 07 DEG 16 MIN 00 SEC
UTM - ZONE: 29 HEMISPHERE: NORTHERN
NORTHING: 3645038 EASTING: 662056
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
GOVERNMENT GRANT

OWNERSHIP	STATUS
OFFICE CHERIFIEN DES PHOSPHATES (GOVT.)-OCP	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1919

---------EXPLORATION METHODS--------
SURFACE GEOLOGICAL MAPPING/DRILLING/
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

MINERALIZED ZONE:
AVERAGE DEPTH: 9.5 METERS
AVERAGE THICKNESS: 12 METERS

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

LIMESTONE	LIES OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE
CHERT	LIES OVER ORE: LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
CALCITE	CARBONATES
QUARTZ	FORMS OF SIO2

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. THIRD EDITION, 1971, PP. 101-106.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980, PP. 42-48.

ENGINEERING & MINING JOURNAL. MOROCCO. PRODUCTION OF PHOSPHATE ROCK..., JULY 1980, V. 181, NO. 7, P. 160.

INTERNATIONAL URANIUM RESOURCES EVALUATION PROGRAM (IUREP), MOROCCO, NO. 14, JUNE 1977.

MINING MAGAZINE. PHOSPHATE IN MOROCCO. VOL. 120, NO. 6, JUNE 1969, PP. 394-398.

PHOSPHORUS & POTASSIUM. FURTHER DETAILS OF OCP'S PLANS FOR THE FUTURE. NO. 112, 1981, PP. 18-21.

PHOSPHORUS & POTASSIUM. OCP UNVEILS ITS PLANS FOR THE 1980S, PT. I & II. NOS. 105 & 106, 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: AL BOROUJ
SEQUENCE NUMBER: 7140150008

NATION: MOROCCO
SUBDIVISION: KHOURIBGA
TYPE OF OPERATION: UNKNOWN
CURRENT STATUS: RAW PROSPECT
LATITUDE: N 32 DEG 35 MIN 00 SEC
LONGITUDE: W 07 DEG 12 MIN 00 SEC
UTM - ZONE: 29 HEMISPHERE: NORTHERN
NORTHING: 3606336 EASTING: 668949
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
GOVERNMENT GRANT

ALTERNATE NAMES
EL BOROUI

OWNERSHIP	STATUS
OFFICE CHERIFIEN DES PHOSPHATES (GOVT.)-OCP.	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1919

--------EXPLORATION METHODS----------
SURFACE GEOLOGICAL MAPPING/SAMPLING/
DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE
CHERT	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
CHERT	FORMS OF SIO2

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. THIRD EDITION, 1971, PP. 101-106.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980, PP. 43-48.

PHOSPHORUS & POTASSIUM. FURTHER DETAILS OF OCP'S PLANS FOR THE FUTURE. NO. 112, 1981, PP. 18-21.

PHOSPHORUS & POTASSIUM. OCP UNVEILS ITS PLANS FOR THE 1980S. PT. I & II. NOS. 105 & 106, 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DAOUI NORD
SEQUENCE NUMBER: 7140150011

NATION: MOROCCO
SUBDIVISION: KHOURIBGA
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 32 DEG 46 MIN 00 SEC
LONGITUDE: W 06 DEG 33 MIN 00 SEC
UTM - ZONE: 29 HEMISPHERE: NORTHERN
NORTHING: 3627886 EASTING: 729503
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 800 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
  GOVERNMENT GRANT

ALTERNATE NAMES
  DAOUI NORD (PODSOLIZED)

OWNERSHIP	STATUS
OFFICE CHERIFIEN DES PHOSPHATES (GOVT.)-OCP	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1919
YEAR OF INITIAL PRODUCTION: 1961

--------EXPLORATION METHODS--------
DRILLING/BEDROCK SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

MINERALIZED ZONE:
  AVERAGE DEPTH: 3 METERS
  MINIMUM DEPTH: 0 METERS
  AVERAGE THICKNESS: 4.2 METERS

UNCONSOLIDATED MATERIAL:
  AVERAGE THICKNESS: 3 METERS

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

LIMESTONE	LIES OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE
CHERT	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
CALCITE	CARBONATES
QUARTZ	FORMS OF SIO2

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 5000 UNITS: MT ORE/DAY
DESCRIPTION OF COVER:
SAND, GRAVEL
AVERAGE COVER THICKNESS: 3 METER
BENCH HEIGHT: 7.2 METERS SLOPE OF PIT: 45 DEGREES

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: MOROCCO
LATITUDE: N 32 46 00 LONGITUDE: W 06 33 00
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 10
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: MOROCCO
LATITUDE: N 32 47 00 LONGITUDE: W 06 32 00

BENEFICIATION:
METHOD: WASHING
DESIGN CAPACITY: 5000
UNITS: MT ORE/DAY
-------DESCRIPTION OF MILLING---------
ORE/SCREEN/LOG WASHING/SCREEN/CYCLONE/
DEWATER/FILTER/DRY/STOCKPILE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	70	34.5	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: MOROCCO
LATITUDE: N 32 47 00 LONGITUDE: W 06 32 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 174
DESTINATION FACILITY: PORT LOCATION: MOROCCO

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. THIRD EDITION, 1971, PP. 101-106.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980, PP. 47-48.

ENGINEERING & MINING JOURNAL. MOROCCO. PRODUCTION OF PHOSPHATE ROCK..., JULY 1980, V. 181, NO. 7, P. 160.

INTERNATIONAL URANIUM RESOURCES EVALUATION PROGRAM (IUREP). MORROCO. NO. 14, JUNE 1977.

MINING MAGAZINE. PHOSPHATE IN MOROCCO. VOL. 120, NO. 6, JUNE 1969, PP. 394-398.

PHOSPHORUS & POTASSIUM. FURTHER DETAILS OF OCP'S PLANS FOR THE FUTURE. NO. 112, 1981, PP. 18-21.

PHOSPHORUS & POTASSIUM. OCP UNVEILS ITS PLANS FOR THE 1980S, PT. I & II. NOS. 105 & 106, 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SOUTHERN KHOURIBGA REGION SEQUENCE NUMBER: 7140150012

NATION: MOROCCO
TYPE OF OPERATION: SURFACE
LATITUDE: N 32 DEG 40 MIN 00 SEC
UTM - ZONE: 29 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY

SUBDIVISION: KHOURIBGA
CURRENT STATUS: EXPLORED DEPOSIT
LONGITUDE: W 07 DEG 05 MIN 00 SEC
NORTHING: 3615767 EASTING: 679735
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
  GOVERNMENT GRANT

ALTERNATE NAMES
  OULAD FARES
  OULED FARES
  KHOURIBGA RESERVES
  RECETTE 10
  MRZIG
  EL HALASSA
  CHENNANE
  EL HALASSA AND CHENNANE
  SIDI CHENNANE
  EL HALASSA AND SIDI CHENNANE

OWNERSHIP	STATUS
OFFICE CHERIFIEN DES PHOSPHATES (GOVT.) - OCP	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1919

----------EXPLORATION METHODS----------
CORE DRILLING/RECONNAISSANCE SOIL SAMPLING/
DETAILED SOIL SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

LIMESTONE	LIES OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE
CHERT	LIES OVER ORE: LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. THIRD EDITION. 1971, PP.101-106.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980, PP. 42-48.

ENGINEERING & MINING JOURNAL. MOROCCO. PRODUCTION OF PHOSPHATE ROCK...., JULY 1980, V. 181, NO. 7, P. 160.

INTERNATIONAL URANIUM RESOURCES EVALUATION PROGRAM (IUREP). MOROCCO. NO. 14, JUNE 1977.

MINING MAGAZINE. PHOSPHATE IN MOROCCO. VOL. 120, NO. 6, JUNE 1969, PP. 394-398.

PHOSPHORUS & POTASSIUM. FURTHER DETAIL OF OCP'S PLAN FOR THE FUTURE. NO. 112, 1981, PP. 18-21.

PHOSPHORUS & POTASSIUM. OCP UNVEILS ITS PLANS FOR THE 1980'S, PT. I & II. NOS. 105 & 106, 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: BEN GUERIR
SEQUENCE NUMBER: 7140190005

NATION: MOROCCO
SUBDIVISION: MARRAKECH
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 32 DEG 14 MIN 00 SEC
LONGITUDE: W 07 DEG 53 MIN 00 SEC
UTM - ZONE: 29 HEMISPHERE: NORTHERN
NORTHING: 3566657 EASTING: 605212
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 750 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
GOVERNMENT GRANT

ALTERNATE NAMES
TESSAOUT
AZALA
EL OUATA
MAZALET EL HARACHA
EAST GANTOUR
YOUSSOUFIA RESERVES

OWNERSHIP	STATUS
OFFICE CHERIFIEN DES PHOSPHATES (GOVT.)-OCP	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
UNDIFFERENTIATED	900,000,000
UNITS	MT ORE
YEAR/DATA	1968

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	29.8	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
ARGALL, G. BEN GUERIR. WORLD MINING, MAY 1968, PP. 24-26.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
PRE-MINERAL IN PLACE
YEAR OF INITIAL PRODUCTION: 1920

------EXPLORATION METHODS-----
SUBSURFACE GEOLOGICAL MAPPING/
DRILLING/TEST PIT

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

LIMESTONE	LIES OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE
CHERT	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
CALCITE	CARBONATES
QUARTZ	FORMS OF SIO2

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
CAPACITY: 12700 UNITS: MT ORE/DAY
DESCRIPTION OF COVER: HARDNESS OF ORE:
MEDIUM-HARD ROCKS SANDS-CONSOLIDATED ROCK

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: MOROCCO
LATITUDE: N 32 14 00 LONGITUDE: W 07 53 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 2
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: MOROCCO
LATITUDE: N 32 14 00 LONGITUDE: W 07 53 00

BENEFICIATION:
METHOD: SIZING ------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 12700 ORE/2 STAGE SCREEN/STOCKPILE
UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
CONCENTRATE	P205	71	27.5	WT-PCT

TRANSPORTATION FOR PRODUCT: CONCENTRATE
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: MOROCCO
LATITUDE: N 32 14 00 LONGITUDE: W 07 53 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 140
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: MOROCCO

BENEFICIATION:
METHOD: WASHING
DESIGN CAPACITY: 8200
UNITS: MT CONCENTRATE/DAY

------DESCRIPTION OF MILLING------
STOCKPILE CONCENTRATE/WASH/SCREEN/
STOCKPILE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	88	30.2	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: MOROCCO
DESTINATION FACILITY: PHOSPHORIC ACID PLANT LOCATION: MOROCCO

BIBLIOGRAPHY RECORDS

ARGALL, C. DEN GUERIF. WORLD MINING, MAY 1968, PP. 24-26.

BRIGHT, V. MOROCCO. MINING ANNUAL REVIEW, 1980, P. 538.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS, MOROCCO. 1980, PP. 134-141.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATES, MOROCCO. 1971, PP. 101-107.

ENGINEERING & MINING JOURNAL. MOROCCO, PRODUCTION OF PHOSPHATE ROCK. JULY 1980, V. 181, NO. 7, P. 160.

INTERNATIONAL URANIUM RESOURCES EVALUATION PROGRAM (IUREP). MORROCO. NO. 14, VIENNA, 1977.

MINING JOURNAL. MOROCCO CONTRACT OF THE CENTURY. FEB 10, 1978, P. 100.

MINING MAGAZINE. PHOSPHATE IN MOROCCO. VOL. 120, NO. 6, JUNE 1969, PP. 394-399.

PHOSPHORUS & POTASSIUM. FURTHER DETAILS OF OCP'S PLANS FOR THE FUTURE. NO. 112, MAR/APR, 1981, PP. 18-21.

PHOSPHORUS & POTASSIUM. OCP UNVEILS ITS PLANS FOR THE 1980S, PART I - PART II. NOS. 105 AND 106, 1980.

SURFACE MINER. BUCYRUS ERIE, PHOSPHATE, A BIG BUSINESS IN MOROCCO. C.1974, PP. 6-7.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MESKALA DISTRICT
SEQUENCE NUMBER: 7140190008

NATION: MOROCCO
SUBDIVISION: MARRAKECH
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 31 DEG 30 MIN 00 SEC
LONGITUDE: W 08 DEG 30 MIN 00 SEC
UTM - ZONE: 29 HEMISPHERE: NORTHERN
NORTHING: 3484939 EASTING: 547483
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 650 METERS
PRECISION: 500 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
  GOVERNMENT GRANT

ALTERNATE NAMES
  CHICHAOUA DEPOSIT
  IMI N' TANOUTE DEPOSIT
  OULAD BOU SBAA
  ENFIFA
  CHICHAOUA
  IMI N' TANOUTE
  THE MESKALA

OWNERSHIP	STATUS
OFFICE CHERIFIEN DES PHOSPHATES (GOVT.)-OCP	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
UNDIFFERENTIATED	20,000,000,000
UNITS	MT ORE
YEAR/DATA	1976

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. SPAIN MAY JOIN MOROCCO IN MESKALA PHOSPHATES. JULY 1976, P. 27.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1908

--------EXPLORATION METHODS--------
DRILLING/BEDROCK SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: FAULTING; FOLDING

MINERALIZED ZONE:
AVERAGE DEPTH: 5 METERS MINIMUM DEPTH: 2 METERS
AVERAGE THICKNESS: 2.5 METERS

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 5 METERS MINIMUM THICKNESS: 2 METERS

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

LIMESTONE	LIES OVER ORE; LIES UNDER ORE
CHERT	LIES OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
CALCITE	CARBONATES
QUARTZ	FORMS OF SIO2

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS, MOROCCO. 1980, PP. 134-141.

ENGINEERING AND MINING JOURNAL. SPAIN MAY JOIN MOROCCO IN MESKALA PHOSPHATES. JULY 1976, P. 27.

GRIFFITHS, J.F., ED. CLIMATES OF AFRICA. WORLD SURVEY OF CLIMATOLOGY, VOL. 10, ELSEVIER, N.Y., 1972.

INTERNATIONAL URANIUM RESOURCE EVALUATION PROGRAM (IUREP). MORROCO. NO. 14, VIENNA, 1977.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: YOUSSOUFIA WHITE ROCK
SEQUENCE NUMBER: 7140330001

NATION: MOROCCO
SUBDIVISION: SAFI
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 32 DEG 17 MIN 00 SEC
LONGITUDE: W 08 DEG 20 MIN 00 SEC
UTM - ZONE: 29 HEMISPHERE: NORTHERN
NORTHING: 3571848 EASTING: 562777
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 750 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
  GOVERNMENT GRANT

ALTERNATE NAMES
  BOU TRETICH
  SIDI BOU TRETICH
  YOUSSOUFIA DISTRICT
  RECETTE 3
  RECETTE 4
  RECETTE 5
  RECETTE 6

OWNERSHIP	STATUS
OFFICE CHERIFIEN DES PHOSPHATES (GOVT.)-OCP	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:	---------EXPLORATION METHODS--------
ORE-MINERAL IN PLACE	SURFACE GEOLOGICAL MAPPING/DRILLING/ DETAILED SOIL SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

MINERALIZED ZONE:
  AVERAGE DEPTH: 50 METERS
  MINIMUM DEPTH: 0 METERS
  AVERAGE THICKNESS: 2.4 METERS

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

LIMESTONE	LIES OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE
CHERT	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
CALCITE	CARBONATES
QUARTZ	FORMS OF SIO2

MINE/MILL INFORMATION
MULTIPLE MINES FEED MILL

UNDERGROUND MINING:
METHOD: CONTINUOUS MINING; ROOM AND PILLAR; SHORTWALL MINING; LONGWALL MINING
CAPACITY: 16700 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: MOROCCO
LATITUDE: N 32 17 00 LONGITUDE: W 08 20 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: CONVEYOR DISTANCE (KM): 3
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: MOROCCO
LATITUDE: N 32 15 00 LONGITUDE: W 08 32 00

BENEFICIATION:
METHOD: SIZING
DESIGN CAPACITY: 26500
UNITS: MT ORE/DAY
------- DESCRIPTION OF MILLING -------
ORE/2 STAGE SCREEN/DRY/STOCKPILE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	66	31	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: MOROCCO
LATITUDE: N 32 15 00 LONGITUDE: W 08 32 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 75
DESTINATION FACILITY: PORT LOCATION: MOROCCO

BIBLIOGRAPHY RECORDS

BRIGHT, V. MOROCCO. MINING ANNUAL REVIEW, 1980, P. 538.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. MOROCCO. 1980, PP. 134-141.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATES, MOROCCO. 1971, PP. 101-107.

ENGINEERING & MINING JOURNAL. MOROCCO, PRODUCTION OF PHOSPHATE ROCK. JULY 1980.

INTERNATIONAL URANIUM RESOURCE EVALUATION PROGRAM (IUREP). MORROCO. NO. 14, VIENNA, 1977.

MINING MAGAZINE. PHOSPHATE IN MOROCCO. VOL. 120, NO. 6, JUNE 1969, PP. 394-398.

PHOSPHORUS & POTASSIUM. FURTHER DETAILS OF OCP'S PLANS FOR THE FUTURE. NO. 112, PP. 18-21.

PHOSPHORUS & POTASSIUM. OCP UNVEILS ITS PLANS FOR THE 1980S - PART I AND PART II. NOS. 105 AND 106, 1980.

SURFACE MINER. BUCYRUS ERIE, PHOSPHATE, A BIG BUSINESS IN MOROCCO. C. 1974, PP. 6-7.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: YOUSSOUFIA BLACK ROCK
SEQUENCE NUMBER: 7140330004

NATION: MOROCCO
SUBDIVISION: SAFI
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 32 DEG 15 MIN 00 SEC
LONGITUDE: W 08 DEG 27 MIN 00 SEC
UTM - ZONE: 29 HEMISPHERE: NORTHERN
NORTHING: 3568091 EASTING: 551810
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 750 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
  GOVERNMENT GRANT

ALTERNATE NAMES
  YOUSSOUFIA DISTRICT
  RECETTE 7
  RECETTE 8
  RECETTE 9
  RECETTE 10
  ZONE NOYLE
  FLOODED SECTOR

OWNERSHIP	STATUS
OFFICE CHERIFIEN DES PHOSPHATES (GOVT.)-OCP	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
-------EXPLORATION METHODS-------
  DRILLING
YEAR OF INITIAL PRODUCTION: 1974

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

MINERALIZED ZONE:
  AVERAGE DEPTH: 80 METERS
  MINIMUM DEPTH: 20 METERS
  AVERAGE THICKNESS: 2.4 METERS

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

CHERT	LIES OVER ORE; LIES UNDER ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
QUARTZ	FORMS OF SIO2

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: LONGWALL CAVING; CONTINUOUS MINING; SHORTWALL MINING
CAPACITY: 5300 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: MOROCCO
LATITUDE: N 32 15 00 LONGITUDE: W 08 27 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: CONVEYOR DISTANCE (KM): 3
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: MOROCCO
LATITUDE: N 32 15 00 LONGITUDE: W 08 27 00

BENEFICIATION:
METHOD: CALCINING ------ DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 5300 ORE/SCREEN/CALCINE/DRY/STOCKPILE/SHIP
UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	63	34	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: MOROCCO
LATITUDE: N 32 15 00 LONGITUDE: W 08 27 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 75
DESTINATION FACILITY: PORT LOCATION: SAFI, MOROCCO

BIBLIOGRAPHY RECORDS

BRIGHT, V. MOROCCO. MINING ANNUAL REVIEW. 1980, P. 538.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS, MOROCCO. 1980, PP. 134-141.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATES, MOROCCO. 1971, PP. 101-107.

ENGINEERING & MINING JOURNAL. MOROCCO, PRODUCTION OF PHOSPHATE ROCK. JULY 1980.

INTERNATIONAL URANIUM RESOURCES EVALUATION PROGRAM (IUREP). MOROCCO. NO. 14, I.A.E.A., VIENNA, 1977.

MINING MAGAZINE. PHOSPHATE IN MOROCCO. VOL. 120, NO. 6, JUNE 1969, PP. 394-398.

PHOSPHORUS & POTASSIUM. FURTHER DETAILS OF OCP'S PLANS FOR THE FUTURE. NO. 112, 1981, PP. 18-21.

PHOSPHORUS & POTASSIUM. OCP UNVEILS ITS PLANS FOR THE 1980S - PART I AND PART II. NOS. 105 AND 106, 1980.

SURFACE MINER. CYCYRUS ERIE, PHOSPHATE, A BIG BUSINESS IN MOROCCO. 1974, PP. 6-7.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: YOUSSOUFIA OPEN CAST
SEQUENCE NUMBER: 7140330005

NATION: MOROCCO
SUBDIVISION: SAFI
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 32 DEG 15 MIN 00 SEC
LONGITUDE: W 08 DEG 32 MIN 00 SEC
UTM - ZONE: 29 HEMISPHERE: NORTHERN
NORTHING: 3568053 EASTING: 543960
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 750 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
  GOVERNMENT GRANT

ALTERNATE NAMES
  YOUSSOUFIA DISTRICT
  RECETTE 5
  RECETTE 6

OWNERSHIP	STATUS
OFFICE CHERIFIEN DES PHOSPHATES (GOVT.)- OCP	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF INITIAL PRODUCTION:
  PRIOR TO 1965

----------EXPLORATION METHODS----------
SURFACE GEOLOGICAL MAPPING/CORE DRILLING/
DETAILED SOIL SAMPLING/TEST SHAFT

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING; LITHOLOGY

MINERALIZED ZONE:
  AVERAGE DEPTH: 8.7 METERS
  MINIMUM DEPTH: 0 METERS
  AVERAGE THICKNESS: 2.6 METERS

UNCONSOLIDATED MATERIAL:
  AVERAGE THICKNESS: 8.7 METERS
  MINIMUM THICKNESS: 0 METERS

LITHOLOGY:
GEOLOGIC AGE: TERTIARY
ROCK TYPE:

CHERT	LIES OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE
MARLS	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
QUARTZ	FORMS OF SIO2

MINE/MILL INFORMATION
MULTIPLE MINES FEED MILL

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 9800 UNITS: MT ORE/DAY
DESCRIPTION OF COVER: HARDNESS OF ORE:
SAND, GRAVEL SANDS-CONSOLIDATED ROCK
AVERAGE COVER THICKNESS: 8.7 METERS
BENCH HEIGHT: 10 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: MOROCCO
LATITUDE: N 32 15 00 LONGITUDE: W 08 32 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: CONVEYOR DISTANCE (KM): 5
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: MOROCCO
LATITUDE: N 32 15 00 LONGITUDE: W 08 32 00

BENEFICIATION:
METHOD: SIZING ------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 26500 ORE/2 STAGES SCREENING/DRY/STOCKPILE
UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	66	31.2	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: MOROCCO
LATITUDE: N 32 15 00 LONGITUDE: W 08 32 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 75
DESTINATION FACILITY: PORT LOCATION: MOROCCO

BIBLIOGRAPHY RECORDS

BRIGHT, V. MOROCCO. MINING ANNUAL REVIEW, 1980, P. 538.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS, MOROCCO. 1980, PP. 134-141.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATES, MOROCCO. 1971, PP. 101-107.

ENGINEERING & MINING JOURNAL. MOROCCO, PRODUCTION OF PHOSPHATE ROCK. JULY 1980.

INTERNATIONAL URANIUM RESOURCE EVALUATION PROGRAM (IUREP). MORROCO. NO. 14, VIENNA, 1977.

MINING MAGAZINE. PHOSPHATE IN MOROCCO. VOL. 120, NO. 6, JUNE 1969, PP. 394-398.

PHOSPHORUS & POTASSIUM. FURTHER DETAILS OF OCP'S PLANS FOR THE FUTURE. NO. 106, MAR/APR, 1980, PP. 34-43.

PHOSPHORUS & POTASSIUM. OCP UNVEILS ITS PLANS FOR THE 1980S. NO. 105, JAN/FEB, 1980.

PHOSPHORUS & POTASSIUM. FURTHER DETAILS OF OCP'S PLANS FOR THE FUTURE. NO. 112, 1981, PP. 18-21.

SURFACE MINER. BUCYRUS ERIE, PHOSPHATE, A BIG BUSINESS IN MOROCCO. C. 1974, PP. 6-7.

NAURU

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: NAURU ISLAND
SEQUENCE NUMBER: 6170000001

NATION: NAURU
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: S 00 DEG 32 MIN 00 SEC
LONGITUDE: E 166 DEG 56 MIN 00 SEC
UTM - ZONE: 58 HEMISPHERE: SOUTHERN
NORTHING: 9941020 EASTING: 715165
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 35 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP
NAURU PHOSPHATE CORPORATION

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	25,000,000
INDICATED	5,000,000
UNITS	MT ORE
YEAR/DATA	1980

RESERVE-RESOURCE - REMARKS

RECORD 1: HIGH-GRADE PHOSPHATE ORE (82-90 PERCENT BONE PHOSPHATE OF LIME).

SOURCE FOR RECORD 1:
SRI INTERNATIONAL. CHEMICAL ECONOMICS HANDBOOK, MARCH 1980.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1900
YEAR OF INITIAL PRODUCTION: 1907

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: IRREGULAR

MINERALIZED ZONE:
MINIMUM DEPTH: 0.05 METER
AVERAGE THICKNESS: 7.6 METERS

UNCONSOLIDATED MATERIAL:
  MINIMUM THICKNESS: 0.05 METER

LITHOLOGY:
  GEOLOGIC AGE: PLEISTOCENE
  ROCK TYPE:
    PHOSPHORITE IS ORE
    LIMESTONE LIES ALONG ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
  METHOD: STRIPPING
  CAPACITY: 7200 UNITS: MT ORE/DAY
  DESCRIPTION OF COVER:
    SAND, SILT

TRANSPORTATION (ORE):
  ORIGINATING FACILITY: MINE LOCATION: NAURU
  LATITUDE: S 00 32 00 LONGITUDE: E 166 56 00
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: TRUCK; RAIL DISTANCE (KM): 2; 4
  DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: NAURU

BENEFICIATION:
  METHOD: SIZING
  DESIGN CAPACITY: 7200
  UNITS: MT ORE/DAY
  ----------DESCRIPTION OF MILLING----------
  ORE FEED/SCREEN/CRUSH/2ND SCREEN/2ND CRUSH/
  DRY/SCREEN/CRUSH/PELLETIZE/PHOSPHATE PRODUCT

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	93	38.8	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
  ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: NAURU
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: OCEAN
  DESTINATION FACILITY: MARKET

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP. WORLD SURVEY OF PHOSPHATE DEPOSITS. 3RD EDITION, 1973.

_____. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

SRI INTERNATIONAL. CHEMICAL ECONOMICS HANDBOOK, MARCH 1980.

COMMONWEALTH INSTITUTE. COMMONWEALTH FACT SHEET. NAURU, 1975.

PHOSPHORUS & POTASSIUM. THE NAURU PHOSPHATE INDUSTRY. BRITISH SULPHUR CORP., 1972.

WORLD MINING. D.R.I., 1980.

PAKISTAN

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HAZARA
SEQUENCE NUMBER: 5350150016

NATION: PAKISTAN
SUBDIVISION: NORTH WEST FRONTIER
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 34 DEG 13 MIN 00 SEC
LONGITUDE: E 73 DEG 12 MIN 00 SEC
UTM - ZONE: 43 HEMISPHERE: NORTHERN
NORTHING: 3787449 EASTING: 334183
POINT OF REFERENCE: ORE BODY
ELEVATION: 1600 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
KAKUL (KAKIL, KAKOOL)
LAGARBAN

OWNERSHIP
GOVERNMENT OF PAKISTAN
INDUSTRIAL MINERAL ENTERPRISES

STATUS
OWNER
OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
INFERRED	500,000	14,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1979	1979

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	28.5	WT-PCT
2	P205	27	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: RESERVES ATTRIBUTED TO THE KAKUL DEPOSIT.
RECORD 2: RESERVES ATTRIBUTED TO THE LAGARBAN DEPOSIT.

SOURCE FOR RECORDS 1 AND 2:
WORLD MINING DIRECTORY. PAKISTAN. NUMBER 1979, AUGUST 1979.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1970

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: LITHOLOGY

MINERALIZED ZONE:
AVERAGE THICKNESS: 2 METERS

LITHOLOGY:
NAME OF FORMATION: ABBOTTABAD GEOLOGIC AGE: LOWER CAMBRIAN
ROCK TYPE:
PHOSPHORITE IS ORE
DOLOMITE LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
DAHLITE	PHOSPHATES
FRANCOLITE	PHOSPHATES
DOLOMITE	CARBONATES

BIBLIOGRAPHY RECORDS

ASARULLAH. PHOSPHATE, POTASH AND NATURAL GAS OCCURRENCES IN PAKISTAN. IN: LEE, A.I. (EDITOR), FERTILIZER MINERAL OCCURRENCES IN THE ASIA-PACIFIC REGION, FEBRUARY 1980, PP. 66-67.

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980, P. 174.

COOK, P. J. AND J. H. SHERGOLD (EDITORS). PROTEROZOIS AND CAMBRIAN PHOSPHORITES. REPORT ON THE FIRST INTERNATIONAL MEETING OF IGCP PROJECT 156, ANU PRESS, CANBERRA, 106 PP.

INDUSTRIAL MINERALS. PAKISTAN: GREEN LIGHT FOR PO4 PROJECT. APRIL 1981, P. 15.

MINING JOURNAL. PHOSPHATE STUDY IN PAKISTAN. JULY 25, 1980.

MINING MAGAZINE. PAKISTAN PHOSPHATES. MAY 1977.

SHELDON, R. P. AND W. C. BURNETT (EDITORS). FERTILIZER MINERAL POTENTIAL IN ASIA AND THE PACIFIC. PROCEEDINGS OF THE FERTILIZER RAW MATERIALS RESOURCES WORKSHOP, AUGUST 20-24, 1979, HONOLULU, HAWAII, 477 PP.

SPATE, O. H. K. INDIA AND PAKISTAN: A GENERAL AND REGIONAL GEOGRAPHY. SECOND EDITION, 1957, 829 PP.

WORLD MINING CATALOG. PAKISTAN. SURVEY AND DIRECTORY NUMBER 1980, AUGUST 1980, P. 204.

WORLD MINING CATALOG. PAKISTAN. SURVEY AND DIRECTORY NUMBER 1981, AUGUST 1981, PP. 145, 146.

WORLD MINING DIRECTORY. PAKISTAN. NUMBER 1979, AUGUST 1979.

PERU

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: BAYOVAR
SEQUENCE NUMBER: 3330370001

NATION: PERU
SUBDIVISION: PIURA
TYPE OF OPERATION: SURFACE
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: S 05 DEG 50 MIN 15 SEC
LONGITUDE: W 81 DEG 02 MIN 15 SEC
UTM - ZONE: 17 HEMISPHERE: SOUTHERN
NORTHING: 9354799 EASTING: 495848
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: -14 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
  STATE LEASE; MINERALS ONLY

ALTERNATE NAMES
  PROBAYOVAR
  SECHURA DESERT

OWNERSHIP
  MINEROPERU (GOVERNMENT OWNED)

STATUS
  OWNER-OPERATOR

COMMODITY
  PHOSPHATE

MARKETABILITY
  PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1958

-------EXPLORATION METHODS-------
MAPPING/CORE DRILLING/TRENCHING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: FAULTING

LITHOLOGY:
  NAME OF FORMATION: ZAPAYAL FORMATION GEOLOGIC AGE: MIOCENE
  DEFORMATION DESCRIPTION: FAULTING
  RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
  ROCK TYPE:

PHOSPHORITE	IS ORE
SANDSTONE	LIES OVER ORE; LIES UNDER ORE
SAND	LIES OVER ORE; LIES UNDER ORE
OTHER PELAGIC SEDIMENTS	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
DIATOMITE	SILICATES
GYPSUM	SULFATES & CHROMATES

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. WORLD SURVEY OF PHOPHATES. 4TH EDITION 1980.

CHENEY, M T ET AL. THE SECHURA PHOSPHATE DEPOSITS OF PERU. ECON. GEOLOGY, VOL. 74, NO. 2, 1979.

SAUDI ARABIA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: WEST THANIYAT
SEQUENCE NUMBER: 5170000005

NATION: SAUDI ARABIA
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 29 DEG 45 MIN 00 SEC
LONGITUDE: E 38 DEG 02 MIN 45 SEC
UTM - ZONE: 37 HEMISPHERE: NORTHERN
NORTHING: 3291286 EASTING: 407739
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
THANIYAT AREA
THANIYAT-TURAYF

TYPE OF MINERAL HOLDING
GOVERNMENT CONTROLLED

OWNERSHIP	STATUS
SAUDI ARABIA (PETROMIN)	OWNER
GRANGES (OF SWEDEN)	OWNER

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
UNDIFFERENTIATED	225,000,000
UNITS	MT ORE
YEAR/DATA	1980

RESERVE-RESOURCE - REMARKS

RECORD 1: RESERVES WERE REPORTED BETWEEN 150 AND 300 MILLION MT.

SOURCE FOR RECORD 1:
BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
SAMPLING/ CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY; DISSEMINATED
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: LENTICULAR
CONTROLLING FEATURES: LITHOLOGY
DEGREE OF WALL ROCK ALTERATION: NONE

MINERALIZED ZONE:
MINIMUM DEPTH: 20 METERS AVERAGE THICKNESS: 1.65 METERS

UNCONSOLIDATED MATERIAL:
MINIMUM THICKNESS: 20 METERS

LITHOLOGY:
NAME OF FORMATION: ARUMA SANDSTONE GEOLOGIC AGE: LOWER CRETACEOUS
DEFORMATION DESCRIPTION: FAULTING
ROCK TYPE:

CHERT	LIES OVER ORE
MUDSTONE	LIES OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE
SILTSTONE	LIES OVER ORE; LIES UNDER ORE
SANDSTONE	LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
APATITE	PHOSPHATES	PHANERITIC-FINE

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

CATHCART, J. B. TEXTURE AND COMPOSITION OF OUTCROPPING PHOSPHORITE IN THE TURAYF REGION, NORTHERN SAUDI ARABIA. U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 600-C, PP. C4-C12.

JACK, J. I., ET AL. CORING SOFT PHOSPHORITE USING AIR FLUSHING. WORLD MINING, APRIL 1981, PP. 48-51.

MEISSNER, C. R., JR. PHOSPHATE DEPOSITS IN THE SIRHAN-TURAYF BASIN. IN MINERAL RESOURCES RESEARCH, 1967-1968, PP. 52-52, SAUDI ARABIA. MIN. PETROL. MINER. RESOUR., JIDDAH, 1969.

MINING MAGAZINE. SAUDI ARABIAN EXPLORATION. NOVEMBER 1975, P. 743.

WORLD MINING. SAUDI ARABIA. CATALOG AND DIRECTORY 1979.

WORLD MINING. SAUDI ARABIA. CATALOG AND DIRECTORY #1980.

WORLD MINING. SAUDI ARABIA. CATALOG AND DIRECTORY #1981.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: TURAYF
SEQUENCE NUMBER: 5170000007

NATION: SAUDI ARABIA
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: UNKNOWN
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 31 DEG 40 MIN 00 SEC
LONGITUDE: E 39 DEG 13 MIN 00 SEC
UTM - ZONE: 37 HEMISPHERE: NORTHERN
NORTHING: 3503323 EASTING: 520539
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

OWNERSHIP
SAUDI ARABIA

STATUS
OWNER

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
INFERRED	1,100,000,000	85,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1969	1969

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	16	WT-PCT
2	P205	17.8	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORDS 1 AND 2:
MEISSNER, C. R., JR. PHOSPHATE DEPOSITS IN THE SIRHAN-TURAYF BASIN. IN: MINERAL RESOURCES RESEARCH, 1967-68, PP. 52-53, SAUDI-ARABIA, MIN. PETROL. MINER. RESOUR., JIDDAH, 1969.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1965

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION

MINERALIZED ZONE:
STRIKE: N90E
AVERAGE THICKNESS: 71 METERS

LITHOLOGY:
NAME OF FORMATION: HIBR
GEOLOGIC AGE: EOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	NEAR ORE
CHERT	NEAR ORE
CLAY	NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
CHERT	FORMS OF SIO2
CALCITE	CARBONATES

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

CATHCART, J. B. TEXTURE AND COMPOSITION OF OUTCROPPING PHOSPHORITE IN THE TURAYF REGION, NORTHERN SAUDI ARABIA. U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 600-C, PP. C4-C12.

MEISSNER, C. R., JR. PHOSPHATE DEPOSITS IN THE SIRHAN-TURAYF BASIN. IN: MINERAL RESOURCES RESEARCH, 1967-68, PP. 52-53, SUADI ARABIA, MIN. PETROL. MINER. RESOUR., JIDDAH, 1969.

SENEGAL

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: PALLO (THIES)
SEQUENCE NUMBER: 7440350001

NATION: SENEGAL
SUBDIVISION: THIES
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 14 DEG 48 MIN 00 SEC
LONGITUDE: W 17 DEG 05 MIN 00 SEC
UTM - ZONE: 28 HEMISPHERE: NORTHERN
NORTHING: 1637146 EASTING: 275773
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 75 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP	STATUS
SOCIETE SENEGALAISE DES PHOSPHATES DE THIES	OPERATOR
SENEGALESE GOVERNMENT	OWNER
RHONE-POULENC OF FRANCE	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	50,000,000
INDICATED	50,000,000
UNITS	MT ORE
YEAR/DATA	1981

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	26.7	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
BRITISH SULFUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS, 1980.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
-------EXPLORATION METHODS-------
GEOLOGICAL/DRILLING
YEAR OF INITIAL PRODUCTION: 1953

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 3 METERS
AVERAGE THICKNESS: 17 METERS

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 3 METERS

LITHOLOGY:
NAME OF FORMATION: UPPER LUTETIAN GEOLOGIC AGE: EOCENE
ROCK TYPE:
UNSPECIFIED SEDIMENTARY IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
WAVELLITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
CAPACITY: 1964 UNITS: MT ORE/DAY
DESCRIPTION OF COVER: HARDNESS OF ORE:
SAND, SILT HARD ROCKS
AVERAGE COVER THICKNESS: 3 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: PALLO (THEIS) PIT
LATITUDE: N 14 48 00 LONGITUDE: W 17 05 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 9
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: LAM LAM

BENEFICIATION:
METHOD: SIZING --------- DESCRIPTION OF MILLING --------
DESIGN CAPACITY: 1964 ORE/CRUSH/VIBRATING SCREEN/30% CALCINATED
UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	94	28.0	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: LAM LAM
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: PORT LOCATION: DAKAR

BIBLIOGRAPHY RECORDS

AMERICAN EMBASSY DAKAR. MINERALS: THE PHOSPHATE MINING INDUSTRY OF SENEGAL. MARCH 7, 1966.

BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980.

CAPE, J.J. WORLD PHOSPHATE STUDY DEPOSIT EVALUATION, SENEGAL. DECEMBER 1980.

INTERNATIONAL URANIUM RESOURCES EVALUATION (IUREP). SENEGAL. NO. 16, AIEA, VIENNA, 1980.

LOUIS, P.L. PHOSPHATE ROCK PRODUCTION IN ALGERIA, SENEGAL AND TOGO: PRESENT SITUATION AND PROSPECTS. DECEMBER 1979, PP. 20-24.

MINERAL TRADE NOTES. V. 73, NO. 4, P. 7.

MINING ANNUAL REVIEW, SENEGAL. 1980.

WORLD MINING DIRECTORY. SENEGAL. NO. 1979.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: TAIBA

SEQUENCE NUMBER: 7440350002

NATION: SENEGAL
TYPE OF OPERATION: SURFACE
LATITUDE: N 15 DEG 00 MIN 00 SEC
UTM - ZONE: 28 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY
ELEVATION: 10 METERS
DATUM: SEA LEVEL

SUBDIVISION: THIES
CURRENT STATUS: PRODUCER
LONGITUDE: W 17 DEG 25 MIN 00 SEC
NORTHING: 1659643 EASTING: 240119
PRECISION: 1 KILOMETER
PRECISION: 10 METERS
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
KEUR-MOR-FALL
N'DOMOR-DIOP
TURENE

OWNERSHIP	STATUS
COMPAGNIE SENEGALAISE DE PHOSPHATES DE TAIBA	OPERATOR
SENEGALESE GOVERNMENT	OWNER
BRGM (FRANCE)	OWNER
INTERNATIONAL MINERALS & CHEMICALS CORP.	OWNER
NOUVELLE CIE FINANCIERE POUR L'OUTRE-MER	OWNER
UNKNOWN OWNERS	OWNER

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
MEASURED	370,000,000	------
INFERRED	------	75,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1979	1980

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	27	WT-PCT
2	P2O5	27	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
CHELDRICK, W. F. AND H. STIER. WORLD PHOSPHATE SURVEY. WORLD BANK, SEPT. 1979, PP. 74-77.

SOURCE FOR RECORD 2:
BLUE, T. A. AND R. PORTILLO. PHOSPHATE ROCK. CEH MARKETING RESEARCH REPORT - SRI INTERNATIONAL, MARCH 1980.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1945
YEAR OF INITIAL PRODUCTION: 1960

--------EXPLORATION METHODS--------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
  AVERAGE DEPTH: 25 METERS MINIMUM DEPTH: 20 METERS
  AVERAGE THICKNESS: 6 METERS

UNCONSOLIDATED MATERIAL:
  AVERAGE THICKNESS: 25 METERS MINIMUM THICKNESS: 20 METERS

LITHOLOGY:
  NAME OF FORMATION: CLAIBORNE FORMATION GEOLOGIC AGE: EOCENE
  ROCK TYPE:

PHOSPHORITE	IS ORE
CHERT	GANGUE
LIMESTONE	GANGUE
CLAY	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES
CRANDALLITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
  METHOD: STRIPPING
  CAPACITY: 22000 UNITS: MT ORE/DAY
  DESCRIPTION OF COVER:
    SAND, SILT

TRANSPORTATION (ORE):
  ORIGINATING FACILITY: MINE LOCATION: TAIBA PIT
  LATITUDE: N 15 00 00 LONGITUDE: W 17 25 00
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: TRUCK; PIPELINE DISTANCE (KM): 3.5; 2.5
  DESTINATION FACILITY: MILL (OFF-SITE)

BENEFICIATION:
METHOD: FLOTATION
DESIGN CAPACITY: 22000
UNITS: MT ORE/DAY

--------- DESCRIPTION OF MILLING ----------
ORE/WASH/GRIND/FLOTATION/DEWATERING FILTERS
ROTARY DRYER/STOCKPILE/LOADOUT

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	32	37.9	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE)
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: PORT LOCATION: DAKAR

BIBLIOGRAPHY RECORDS

BLUE, T. A., AND R. PORTILLO. PHOSPHATE ROCK. CEH MARKETING RESEARCH REPORT - SRI INTERNATIONAL, MARCH 1980.

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980, 1980, P. 124-128.

CATHCART, J. B. URANIUM IN PHOSPHATE ROCK. U.S.G.S. OPEN-FILE REPORT. 75-321, 1975, 20 P.

CEVOTO, R. H., ED. URANIFEROUS PHOSPHATE RESOURCES. GJBX 110 (79), 1979.

PHOSPHOROUS & POTASSIUM. SENEGAL. NOS. 94,98, 99, 1978-9.

SHELDRICK, W. F., AND H. STIER. WORLD PHOSPHATE SURVEY. WORLD BANK, SEPT. 1979, PP. 74-77.

WORLD MINING. SENEGAL. DIRECTORY NUMBER, 1979.

SOUTH AFRICA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: PALABORA
SEQUENCE NUMBER: 7910200132

NATION: SOUTH AFRICA
SUBDIVISION: TRANSVAAL
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: S 24 DEG 03 MIN 00 SEC
LONGITUDE: E 31 DEG 08 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: SOUTHERN
NORTHING: 7339130 EASTING: 310186
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 403 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
BASE METAL CLAIMS

ALTERNATE NAMES
PHALABORA
PHALABORWA

OWNERSHIP	STATUS
PHOSPHATE DEVELOPMENT CORPORATION (FOSKOR)	OWNER-OPERATOR

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
COPPER		BYPRODUCT
IRON	MAGNETITE	BYPRODUCT
BADDELEYITE		BYPRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INDICATED	12,887,000,000
INFERRED	32,318,000,000
UNITS	MT ORE
YEAR/DATA	1975

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	6.5	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: INDICATED RESERVES TO 600 METERS DEPTH; INFERRED TO 1500 METERS.

SOURCE FOR RECORD 1:
ROUX, E. H. THE SOUTH AFRICAN PHOSPHATE ROCK INDUSTRY. FERTILIZER SOCIETY OF SOUTH AFRICA JOURNAL, VOL. 2, 1975.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1906
YEAR OF INITIAL PRODUCTION: 1931

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: STOCKWORK
MODE OF ORIGIN: MAGMATIC DIFFERENTIATION
SHAPE OF ORE BODY: PIPELIKE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
  AVERAGE DEPTH: 10 METERS MINIMUM DEPTH: 10 METERS
  AVERAGE THICKNESS: 1000 METERS

LITHOLOGY:
  NAME OF FORMATION: PALABORA IGNEOUS COMPLEX GEOLOGIC AGE: PRECAMBRIAN
  DEFORMATION DESCRIPTION: INTRUSION
  RELATIONSHIP TO MINERALIZATION: MINERALIZATION DURING DEFORMATION
    GEOLOGIC AGE: PRECAMBRIAN
  ROCK TYPE:
    ALKALIC IGNEOUS IS ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
PHLOGOPITE	SILICATES
PYROXENE	SILICATES
DIOPSIDE	SILICATES
BORNITE	SULFIDES

MINE/MILL INFORMATION
PRESENT PRODUCTION

SURFACE MINING:
  METHOD: OPEN-PIT
  CAPACITY: 61600 UNITS: MT ORE/DAY
  DESCRIPTION OF COVER: HARDNESS OF ORE:
    MEDIUM HARD ROCKS MEDIUM HARD ROCKS
  AVERAGE COVER THICKNESS: 10 METERS SURFACE AREA OF MINE: 2000 HECTARES
  PERCENT WASTE ROCK: 33.3

TRANSPORTATION (ORE):
  ORIGINATING FACILITY: MINE LOCATION: SOUTH AFRICA
  LATITUDE: S 24 03 00 LONGITUDE: E 31 08 00
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: TRUCK
  DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: SOUTH AFRICA
  LATITUDE: S 24 00 00 LONGITUDE: E 31 08 00

BENEFICIATION:
METHOD: FLOTATION
DESIGN CAPACIY: 52300
UNITS: MT ORE/DAY

-------DESCRIPTION OF MILLING-------
ORE/CRUSH/SCREEN/ GRIND/FLOAT/
DEWATER/DISPATCH

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE CONCENTRATE	P205	83	36.5	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE CONCENTRATE
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: SOUTH AFRICA
LATITUDE: S 24 00 00 LONGITUDE: E 31 08 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: MARKET LOCATION: SOUTH AFRICA

BIBLIOGRAPHY RECORDS

DIXON. ATLAS OF WORLD MINING - SOUTH AFRICA. 1979.

ENGINEERING AND MINING JOURNAL. NEL, VIC, PALABORA'S NEW HEAVY MINERALS PLANTS ADDS URANIUM CONCENTRATE TO THE RECOVERY LIST. NOV. 1972.

ENGINEERING AND MINING JOURNAL. WHAT IS BELIEVED TO BE THE WORLD'S LARGEST MOBILE CRUSHING UNIT.... MARCH 1980.

HANEKOM, H. J., C. M. V. H. VAN STADEN, P. J. SMIT, AND D. E. PIKE. THE GEOLOGY OF THE PALABORA IGNEOUS COMPLEX. SOUTH AFRICA DEPT. OF MINES, GEOLOGICAL SURVEY, MEMOIR 54, PRETORIA, 1965.

HEINRICH, E. WM. THE PALABORA CARBONATITIC COMPLEX-- A UNIQUE COPPER DEPOSIT. CANADIAN MINERALOGIST, VOL. 19, PART 7, 1970, P. 585-598.

JAGER, D. H. DE AND P. J. FOURIE. A REVIEW OF SOME NEW ASPECTS ON PHOSPHATE MINERALIZATION IN THE PALABORA IGNEOUS COMPLEX SOUTH AFRICA. AIME, DENVER, FEB.-MAR.,1978.

MINING ANNUAL REVIEW - 1980. P. 496.

PALABORA MINING CO., LTD. PALABORA, SOUTH AFRICA. JULY 1977.

PHOSPHATE DEVELOPMENT CORPORATION, COETZEE, C. B. AND VISSER, H. N. AND MEHLISS, A. T. M., PHOSPHATES: MINERAL RESOURCES OF THE REPUBLIC OF SOUTH AFRICA, 5TH EDITION, HANDBOOK 7, 1976, 8 P.

PHOSPHATE DEVELOPMENT CORP., LTD. ANNUAL REPORT. 1980.

ROUX, E. H. THE SOUTH AFRICAN PHOSPHATE ROCK INDUSTRY. FERTILIZER SOCIETY OF SOUTH AFRICA JOURNAL, VOL. 2, 1975.

RUSSELL, B. G. THE POSSIBLE RECOVERY, DURING THE MANUFACTURE OF PHOSPHORIC ACID, OF RARE EARTHS FROM FOSKOR CONCENTRATE. BULLETIN NO. 1, MINERALS BUREAU, JOHANNESBURG, SOUTH AFRICA, 1977.

SYRIA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SHARKYA (A&B)

SEQUENCE NUMBER: 5020000002

NATION: SYRIA
TYPE OF OPERATION: SURFACE
LATITUDE: N 34 DEG 43 MIN 00 SEC
UTM - ZONE: 37 HEMISPHERE: NORTHERN
POINT OF REFERENCE: ORE BODY

SUBDIVISION: NOT SUBDIVIDED
CURRENT STATUS: PRODUCER
LONGITUDE: E 36 DEG 42 MIN 00 SEC
NORTHING: 3843834 EASTING: 289375
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
EASTERN A & B
AL-SHARQIA A & B

OWNERSHIP
GEOCOPHAM (GOVERNMENT OWNED)

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
UNDIFFERENTIATED	405,000,000
UNITS	MT ORE
YEAR/DATA	1980

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	24	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1933
YEAR OF INITIAL PRODUCTION: 1974

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR

-------EXPLORATION METHODS------
CORE DRILLING/TEST PITS/
TRENCHING

MINERALIZED ZONE:
AVERAGE LENGTH: 4000 METERS
AVERAGE THICKNESS: 12 METERS

AVERAGE WIDTH: 3500 METERS

LITHOLOGY:
NAME OF FORMATION: CAMPANIAN SERIES GEOLOGIC AGE: UPPER CRETACEOUS
DEFORMATION DESCRIPTION: MINOR FOLDING
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
CALCITE	CARBONATES
QUARTZ	FORMS OF SIO2

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: SYRIA
LATITUDE: N 34 43 00 LONGITUDE: E 36 42 00
PERCENT SHIPPED: 100
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: SYRIA
LATITUDE: N 34 43 00 LONGITUDE: E 36 42 00

BENEFICIATION:
METHOD: CLASSIFIER ---------- DESCRIPTION OF MILLING -------
ORE/CRUSH/DRY/SCREEN/CLASSIFY/STOCKPILE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	69	30	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: SYRIA
LATITUDE: N 34 43 00 LONGITUDE: E 36 42 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 250
DESTINATION FACILITY: PORT LOCATION: TARTOUS, SYRIA

BIBLIOGRAPHY RECORDS

U S BUREAU OF MINES. MINERAL TRADE NOTES. VOL 75, NO 2, FEBRUARY 1978, P. 14.

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: TARAG EL HSARI
SEQUENCE NUMBER: 5020000003

NATION: SYRIA
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: UNKNOWN
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 34 DEG 10 MIN 00 SEC
LONGITUDE: E 38 DEG 50 MIN 00 SEC
UTM - ZONE: 37 HEMISPHERE: NORTHERN
NORTHING: 3780453 EASTING: 484638
POINT OF REFERENCE: ORE BODY
PRECISION: 5 KILOMETERS
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
SIJRI HASBARI
AL HABERI
AL MABERI

OWNERSHIP	STATUS
GENERAL COMPANY OF PHOSPHATE MINES-GECOPHAM (GOVERNMENT)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
UNDIFFERENTIATED	400,000,000	450,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1980	1979

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	19	WT-PCT
2	P2O5	19	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS, 1980.

UNITED STATES BUREAU OF MINES. MINERAL TRADE NOTES. VOL. 57, NO. 3, SEPTEMBER 1963.

SOURCE FOR RECORD 2:

EARTH SCIENCES, INC. URANIFEROUS PHOSPHATES RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATES RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, 1979.

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION

MINERALIZED ZONE:
AVERAGE THICKNESS: 0.4 METER

LITHOLOGY:
GEOLOGIC AGE: EOCENE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980.

EARTH SCIENCES, INC. URANIFEROUS PHOSPHATES RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATES RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, 1979.

ECONOMIC GEOLOGY. PHOSPHATIC DEPOSITS IN SYRIA AND SAFAGA DISTRICT, EGYPT. VOL. 61, 1966, PP. 1142-1161.

THE OXFORD MAP OF SYRIA. GEOPROJECTS. P.O. BOX 113.529, BEIRUT, LEBANON.

UNITED STATES BUREAU OF MINES. MINERAL TRADE NOTES. VOL. 57, NO. 3, SEPTEMBER 1963.

UNITED STATES BUREAU OF MINES. MINERAL TRADE NOTES. VOL. 67, NO. 2, FEBRUARY 1970.

UNITED STATES BUREAU OF MINES. MINERAL TRADE NOTES. 75, NO. 2, FEBRUARY 1978.

WORLD BANK. WORLD PHOSPHATE SURVEY BACKGROUND PAPERS. SEPTEMBER 1979.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: KNEIFESS
SEQUENCE NUMBER: 5020000004

NATION: SYRIA
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 34 DEG 05 MIN 00 SEC
LONGITUDE: E 38 DEG 05 MIN 00 SEC
UTM - ZONE: 37 HEMISPHERE: NORTHERN
NORTHING: 3771580 EASTING: 415427
POINT OF REFERENCE: ORE BODY
PRECISION: 5 KILOMETERS
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
KHNEIFISS

OWNERSHIP	STATUS
GENERAL CO. OF PHOSPHATE & MINES-GECOPHAM (GOVERNMENT)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2	RECORD 3
MEASURED	16,000,000	------	------
UNDIFFERENTIATED	------	17,000,000	15,000,000
UNITS	MT ORE	MT ORE	MT ORE
YEAR/DATA	1979	1979	1963

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	28	WT-PCT
2	P2O5	28.5	WT-PCT
3	P2O5	28.5	WT-PCT

SOURCE FOR RECORD 1:
WORLD BANK. WORLD PHOSPHATE SURVEY BACKGROUND PAPERS. SEPTEMBER 1979.

SOURCE FOR RECORD 2:
EARTH SCIENCES, INC. URANIFEROUS PHOSPHATES RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, 1979.

SOURCE FOR RECORD 3:
UNITED STATES BUREAU OF MINES. MINERAL TRADE NOTES. VOL. 57, NO. 3, SEPTEMBER 1963.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1933
YEAR OF INITIAL PRODUCTION: 1971

--------EXPLORATION METHODS-------
CORE DRILLING/TRENCHING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

SHAPE OF ORE BODY: MASSIVE

MINERALIZED ZONE:
  AVERAGE THICKNESS: 3.5 METERS

LITHOLOGY:
  GEOLOGIC AGE: EOCENE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
CALCITE	CARBONATES
CHALCEDONY	FORMS OF SIO2
QUARTZ	FORMS OF SIO2

MINE/MILL INFORMATION

SURFACE MINING:
  METHOD: OPEN-PIT
  CAPACITY: 3400 UNITS: MT ORE/DAY
  DESCRIPTION OF COVER:
    MEDIUM-HARD ROCKS

TRANSPORTATION (ORE):
  ORIGINATING FACILITY: MINE LOCATION: SYRIA
  LATITUDE: N 34 05 00 LONGITUDE: E 38 05 00
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 1
  DESTINATION FACILITY: MILL (ON-SITE) LOCATION: SYRIA
  LATITUDE: N 34 05 00 LONGITUDE: E 38 05 00

BENEFICIATION:
  METHOD: SIZING ------- DESCRIPTION OF MILLING -------
  DESIGN CAPACITY: 3400 ORE/GRIND/SIZE/DRY
  UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	69	32	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
  ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: SYRIA
  LATITUDE: N 34 05 00 LONGITUDE: E 38 05 00
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 300
  DESTINATION FACILITY: PORT LOCATION: TARTOUS, SYRIA

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980.

ECONOMIC GEOLOGY. PHOSPHATIC DEPOSITS IN SYRIA AND SAFAGA DISTRICT EGYPT. VOL. 61, 1966, PP. 1142-1161.

EARTH SCIENCES, INC. URANIFEROUS PHOSPHATES RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, 1979.

UNITED STATES BUREAU OF MINES. MINERAL TRADE NOTES. VOL. 57, NO. 3, SEPTEMBER 1963.

UNITED STATES BUREAU OF MINES. MINERAL TRADE NOTES. VOL. 67, NO. 2, FEBRUARY 1970.

UNITED STATES BUREAU OF MINES. MINERAL TRADE NOTES, VOL. 75, NO. 2, FEBRUARY 1978.

WORLD BANK. WORLD PHOSPHATE SURVEY BACKGROUND PAPERS. SEPTEMBER 1979.

TOGO

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DAGBATI
SEQUENCE NUMBER: 7520000001

NATION: TOGO
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 06 DEG 05 MIN 00 SEC
LONGITUDE: E 01 DEG 30 MIN 00 SEC
UTM - ZONE: 31 HEMISPHERE: NORTHERN
NORTHING: 672604 EASTING: 334000
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 30 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP	STATUS
CIE. TOGOLAISE DES MINES DE BENIN - GOVT. (COTOMIB)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1952

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR

MINERALIZED ZONE:
AVERAGE DEPTH: 15 METERS
MINIMUM DEPTH: 7 METERS
STRIKE/DIP: N45E/05S
AVERAGE THICKNESS: 4 METERS

LITHOLOGY:
NAME OF FORMATION: YPRESIAN
GEOLOGIC AGE: EOCENE
ROCK TYPE:

PHOSPHORITE	IS ORE
CLAY	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
COLLOPHANE	PHOSPHATES

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980, PP. 121-124.

DEVOTO, R. H. AND D. N. STEVENS (EDITORS). URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, 1979, PP. 431, 432.

ENGINEERING AND MINING JOURNAL. SHOVEL PRETESTS STRIPPING OF TOGO PHOSPHATE. JUNE 1976, PP. 287, 290.

INTERNATIONAL URANIUM RESOURCES EVALUATION PROGRAM (IUREP). NO. 28, TOGO, AIEA, VIENNA, 1980.

MINERALS YEARBOOK. TOGO. 1978-79, WORLD REVIEW.

MINING ANNUAL REVIEW. TOGO. 1980.

PHOSPHORUS AND POTASSIUM. TOGO. NO. 100, 1979.

WORLD MINING CATALOG. TOGO. SURVEY AND DIRECTORY. NO. 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: HAHATOE/KPOGAME
SEQUENCE NUMBER: 7520200001

NATION: TOGO
SUBDIVISION: REGION MARITIME
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 06 DEG 22 MIN 00 SEC
LONGITUDE: E 01 DEG 23 MIN 00 SEC
UTM - ZONE: 31 HEMISPHERE: NORTHERN
NORTHING: 703972 EASTING: 321182
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 5 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
AKOUMAPE
AKOUMAPE (LOME)
BENIN MINES

OWNERSHIP	STATUS
CIE.COGOLAISE DES MINES DE BENIN (COTOMIB) - TOGO GOVT.	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
INDICATED	130,000,000	------
UNDIFFERENTIATED	------	100,000,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1976	1981

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORED 1:
ENGINEERING AND MINING JOURNAL. SHOVEL PRETEST STRIPPING OF TOGO PHOSPHATE. JUNE 1976, PP. 287, 290.

SOURCE FOR RECORD 2:
WORLD MINING. MAJOR PHOSPHATE PLANS RUINED BY POOR ECONOMY. OCTOBER 1981, P. 80.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1952
YEAR OF INITIAL PRODUCTION: 1961

-------EXPLORATION METHODS----------
TEST SHAFTS/DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION; RESIDUAL CONCENTRATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 15 METERS STRIKE/DIP: N45E/04S
AVERAGE THICKNESS: 4 METERS

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 15 METERS

LITHOLOGY:
NAME OF FORMATION: YPRESIAN GEOLOGIC AGE: EOCENE
ROCK TYPE:
PHOSPHORITE IS ORE; GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
CAPACITY: 15900 UNITS: MT ORE/DAY
DESCRIPTION OF COVER: HARDNESS OF ORE:
SAND, SILT SAND, SILT
AVERAGE COVER THICKNESS: 15 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: HAHOTOE/KPOGAME PITS
LATITUDE: N 06 22 00 LONGITUDE: E 01 23 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 25
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: KPEME

BENEFICIATION:
METHOD: WASHING ---------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 15900 ORE/DRUM SCRUBBERS/WET SCREENING/CYCLONING/
UNITS: MT ORE/DAY DRYING/SCREENING

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	69	36	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: KPEME
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: OCEAN
DESTINATION FACILITY: MARKET

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORP. LTD. TOGO. PHOSPHORUS AND POTASSIUM, NO. 100, 1979.

BRITISH SULPHUR CORP. LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980, P. 121-124.

DEKUN, N. THE MINERAL RESOURCES OF AFRICA. ELSEVIER PUBL. CO., NEW YORK, 1965, PP. 572-573.

DEVOTO, R. H. AND D. N. STEVENS (EDITORS). URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, 1979, P. 431, 432.

ENGINEERING AND MINING JOURNAL. SHOVEL PRETEST STRIPPING OF TOGO PHOSPHATE. JUNE 1976, PP. 287, 290.

INTERNATIONAL URANIUM RESOURCES EVALUATION PROGRAM (IUREP). TOGO. NO. 28, AIEA, VIENNA, 1980.

MINERALS YEARBOOK. TOGO. WORLD REVIEW, 1978-79.

MINING ANNUAL REVIEW. TOGO. 1980.

MINING MAGAZINE. DEC. 1972.

MINING MAGAZINE. APRIL 1974.

SHEKARCHI, E. AND D. HORSE. NOTES ON FIELD TRIP TO IVORY COAST, TOGO, SENEGAL AND MOROCCO. USBM INTL. DATA AND ANALYSIS, WASH., D.C., PP. 8-10.

WORLD MINING. DEC. 1975, P. 80.

WORLD MINING. MAY 1974.

WORLD MINING. MAJOR PHOSPHATE PLANS RUINED BY POOR ECONOMY. OCTOBER 1981, P. 80.

WORLD MINING CATALOG. SURVEY AND DIRECTORY, TOGO. NO. 1980.

TUNISIA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: KALAA KHASBA
SEQUENCE NUMBER: 7230150002

NATION: TUNISIA
SUBDIVISION: EL KEF
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 35 DEG 40 MIN 00 SEC
LONGITUDE: E 08 DEG 40 MIN 00 SEC
UTM - ZONE: 32 HEMISPHERE: NORTHERN
NORTHING: 3946829 EASTING: 469830
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
KALAA DJERDA

OWNERSHIP
CIE DES PHOSPHATES DE GAFSA(GOVT.)

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

YEAR OF INITIAL PRODUCTION: 1893

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
MINIMUM DEPTH: 150 METERS
AVERAGE THICKNESS: 4 METERS

LITHOLOGY:
GEOLOGIC AGE: EOCENE
DEFORMATION DESCRIPTION: MINOR FOLDING; FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
ROCK TYPE:
PHOSPHORITE IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: ROOM AND PILLAR
CHARACTERISTIC OF ROCK: NO PLANES OF WEAKNESS
ROCK AND WATER CONDITIONS: HARDROCK WITH LITTLE WATER
ROCK/MINE SUPPORT: TIMBER
CONDITION OF WORKINGS: OPEN
SHAFTS - NUMBER: 2 AVERAGE DEPTH: 150 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: TUNISIA
LATITUDE: N 35 40 00 LONGITUDE: E 08 40 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: TUNISIA
LATITUDE: N 35 40 00 LONGITUDE: E 08 40 00

BENEFICIATION:
METHOD: WASHING --------DESCRIPTION OF MILLING-------
ORE/WASH/CRUSH/SCREEN/SIZE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	80	30.23	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: TUNISIA
LATITUDE: N 35 40 00 LONGITUDE: E 08 40 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 400
DESTINATION FACILITY: PORT LOCATION: LA GOULETTE, TUNISIA

BIBLIOGRAPHY RECORDS

AMERICAN EMBASSY TUNISIA. INDUSTRIAL OUTLOOK REPORT. JUNE 9, 1980.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. FOURTH EDITION, 1980.

DEVOTO, R.H., AND D.N. STEVENS. URANIFEROUS PHOSPHATE DEPOSITS AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, JUNE 1979.

ENGINEERING AND MINING JOURNAL. TUNISIA BANKS ON NEW TECHNOLOGY; P205 PRODUCTION GOALS. SEPT. 1980.

ENGINEERING AND MINING JOURNAL. TUNISIA; PLANT TO DOUBLE PHOSPHATE PRODUCTION. MAY 1976.

INTERNATIONAL GEOLOGICAL CONGRESS. LES RESERVES MONDIALES EN PHOSPHATES. 14TH, 2 VOLUMES, 1926.

SRI INTERNATIONAL. PHOSPHATE ROCK. CHEMICAL ECONOMICS HANDBOOK, MARCH 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: METLAOUI
SEQUENCE NUMBER: 7230300001

NATION: TUNISIA
SUBDIVISION: GAFSA
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 34 DEG 19 MIN 00 SEC
LONGITUDE: E 08 DEG 25 MIN 00 SEC
UTM - ZONE: 32 HEMISPHERE: NORTHERN
NORTHING: 3797226 EASTING: 446329
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 535 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP
CIE DES PHOSPHATES DE GAFSA (GOVT.)

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	9,500,000
INDICATED	4,200,000
INFERRED	40,900,000
UNITS	MT ORE
YEAR/DATA	1981

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. 1981 E/MJ INTERNATIONAL DIRECTORY OF MINING. 1981, P. 370.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1890
YEAR OF INITIAL PRODUCTION: 1890

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 200 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE THICKNESS: 4.5 METERS
STRIKE: N90E

LITHOLOGY:
NAME OF FORMATION: METLAOUI FORMATION
GEOLOGIC AGE: EOCENE
DEFORMATION DESCRIPTION: MINOR FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: ROOM AND PILLAR
CAPACITY: 2100 UNITS: MT ORE/DAY
CONDITION OF WORKINGS: OPEN
SHAFTS - NUMBER: 5 AVERAGE DEPTH: 100 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: TUNISIA
LATITUDE: N 34 19 00 LONGITUDE: E 08 25 00
METHOD OF TRANSPORTATION: CONVEYOR DISTANCE (KM): 5
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: TUNISIA
LATITUDE: N 34 19 00 LONGITUDE: E 08 25 00

BENEFICIATION:
METHOD: WASHING
DESIGN CAPACITY: 2100
UNITS: MT ORE/DAY

--------DESCRIPTION OF MILLING--------
ORE/SCREEN/CRUSH/SCRUB/SCREEN/DESLIME/
FILTER/DRY/STOCKPILE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	73	30.23	WT-PCT

BIBLIOGRAPHY RECORDS

AMERICAN EMBASSY TUNISIA. INDUSTRIAL OUTLOOK REPORT. JUNE 9, 1980.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. FOURTH EDITION, 1980.

DEVOTO, R.H., AND D.N. STEVENS. URANIFEROUS PHOSPHATE DEPOSITS AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, JUNE 1979.

ENGINEERING AND MINING JOURNAL. TUNISIA BANKS ON NEW TECHNOLOGY; P205 PRODUCTION GOALS. SEPT. 1980.

ENGINEERING AND MINING JOURNAL. TUNISIA: PLANT TO DOUBLE PHOSPHATE PRODUCTION. MAY 1976.

ENGINEERING AND MINING JOURNAL. 1981. E/MJ INTERNATIONAL DIRECTORY OF MINING. 1981, P. 370.

INTERNATIONAL GEOLOGICAL CONGRESS. LES RESERVES MONDIALES EN PHOSPHATES. 14TH, 2 VOLUMES, 1926.

LEWIS, ROBERT S. ELEMENTS OF MINING. NEW YORK. JOHN WILEY AND SONS, INC., 1950.

SRI INTERNATIONAL. PHOSPHATE ROCK. CHEMICAL ECONOMICS HANDBOOK, MARCH 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: KEF ESCHFAIR
SEQUENCE NUMBER: 7230300002

NATION: TUNISIA
SUBDIVISION: GAFSA
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 34 DEG 23 MIN 00 SEC
LONGITUDE: E 08 DEG 28 MIN 00 SEC
UTM - ZONE: 32 HEMISPHERE: NORTHERN
NORTHING: 3804593 EASTING: 450968
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 550 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
KEF ES SCHFAIR
KEF ESH SCHFAIR
KEF ECHFAIER

OWNERSHIP	STATUS
COMPAGNIE DES PHOSPHATES DE GAFSA (GOVT)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
MEASURED	38,000,000	53,900,000
INDICATED	88,000,000	34,800,000
INFERRED	126,000,000	30,600,000
UNITS	MT ORE	MT ORE
YEAR/DATA	1980	1981

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
BRITISH SULPHUR CORP. LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. FOURTH EDITION, 1980.

SOURCE FOR RECORD 2:
ENGINEERING AND MINING JOURNAL. 1981 E/MJ INTERNATIONAL DIRECTORY OF MINING. 1981, P. 370.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1899
YEAR OF INITIAL PRODUCTION: 1972

-------EXPLORATION METHODS-------
CORE DRILLING/TRENCHING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 25 METERS MINIMUM DEPTH: 10 METERS
AVERAGE THICKNESS: 10 METERS STRIKE/DIP: N90E/20N

LITHOLOGY:
NAME OF FORMATION: METLAOUI FORMATION GEOLOGIC AGE: EOCENE
DEFORMATION DESCRIPTION: MINOR FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPITITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 7300 UNITS: MT ORE/DAY
PERCENT WASTE ROCK: 16.7 AVERAGE COVER THICKNESS: 2 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: TUNISIA
LATITUDE: N 34 23 00 LONGITUDE: E 08 28 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 1
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: TUNISIA
LATITUDE: N 34 23 00 LONGITUDE: E 08 28 00

BENEFICIATION:
METHOD: WASHING
DESIGN CAPACITY: 7300
UNITS: MT ORE/DAY

------- DESCRIPTION OF MILLING -------
ORE/CRUSH/STOCKPILE/DRUM-SCRUBBED/
SCREENED/CYCLONE DESLIMED/SCREENED/
FILTERED/DRIED

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	72	30.2	WT-PCT

BIBLIOGRAPHY RECORDS

AMERICAN EMBASSY TUNISIA. INDUSTRIAL OUTLOOK REPORT. JUNE 9, 1980.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. FOURTH EDITION, 1980.

DEVOTO, R.H., AND D.N. STEVENS. URANIFEROUS PHOSPHATE DEPOSITS AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, JUNE 1979.

ENGINEERING AND MINING JOURNAL. TUNISIA BANKS ON NEW TECHNOLOGY AND OPEN PITS TO MEET LOFTY P205 GOALS. SEPT. 1980, PP. 39, 43.

ENGINEERING AND MINING JOURNAL. TUNISIA: PLANT TO DOUBLE PHOSPHATE PRODUCTION. MAY 1976.

ENGINEERING AND MINING JOURNAL. 1981 E/MJ INTERNATIONAL DIRECTORY OF MINING. 1981, PP. 370.

INTERNATIONAL GEOLOGICAL CONGRESS. LES RESERVES MONDIALES EN PHOSPHATES. 14TH, 2 VOLUMES, 1926.

SRI INTERNATIONAL. PHOSPHATE ROCK, CHEMICAL ECONOMICS HANDBOOK. MARCH 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: M'DILLA
SEQUENCE NUMBER: 7230300003

NATION: TUNISIA
SUBDIVISION: GAFSA
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 34 DEG 18 MIN 00 SEC
LONGITUDE: E 08 DEG 46 MIN 00 SEC
UTM - ZONE: 32 HEMISPHERE: NORTHERN
NORTHING: 3795249 EASTING: 478527
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 300 METERS
PRECISION: 10 METERS
YEAR OF INFORMATION: 1981

OWNERSHIP	STATUS
COMPAGNIE DES PHOSPHATES DE GAFSA (GOVT)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	79,880,000
UNITS	MT ORE
YEAR/DATA	1981

SOURCE FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. 1981 E/MJ INTERNATIONAL DIRECTORY OF MINING. 1981, P. 370.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1890

-------EXPLORATION METHODS-------
CORE DRILLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 200 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE THICKNESS: 3 METERS
STRIKE/DIP: N90E/11N

LITHOLOGY:
NAME OF FORMATION: METLAOUI FORMATION
GEOLOGIC AGE: EOCENE
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: ROOM AND PILLAR
CAPACITY: 5400
UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LOCATION: TUNISIA
LATITUDE: N 34 18 00
LONGITUDE: E 08 46 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: CONVEYOR
DISTANCE (KM): 5
DESTINATION FACILITY: MILL (ON-SITE)
LOCATION: TUNISIA
LATITUDE: N 34 18 00
LONGITUDE: E 08 46 00

BENEFICIATION:
METHOD: WASHING
DESIGN CAPACITY: 5400
UNITS: MT ORE/DAY

-------DESCRIPTION OF MILLING-------
ORE/CRUSH/SCRUB/SCREEN/SIZE/DESLIME/
FILTER/DRY/STOCKPILE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	74	30.23	WT-PCT

BIBLIOGRAPHY RECORDS

AMERICAN EMBASSY TUNISIA. INDUSTRIAL OUTLOOK REPORT. JUNE 9, 1980.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. FOURTH EDITION, 1980.

CAPE, J. J. DEPOSIT EVALUATION, 1981. COMPANIE DES PHOSPHATES DE GAFSA, FIVE YEAR PLAN, TABLES FOR YEARS 1978 THROUGH 1984.

DEVOTO, R. H., AND D. N. STEVENS. URANIFEROUS PHOSPHATE DEPOSITS AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, JUNE 1979.

ENGINEERING AND MINING JOURNAL. TUNISIA BANKS ON NEW TECHNOLOGY; P205 PRODUCTION GOALS. SEPT. 1980.

ENGINEERING AND MINING JOURNAL. TUNISIA: PLANT TO DOUBLE PHOSPHATE PRODUCTION. MAY 1976.

ENGINEERING AND MINING JOURNAL. 1981 E/MJ INTERNATIONAL DIRECTORY OF MINING. 1981, P. 370.

INTERNATIONAL GEOLOGICAL CONGRESS. LES RESERVES MONDIALES EN PHOSPHATES. 14TH, 2 VOLUMES, 1926.

SRI INTERNATIONAL, PHOSPHATE ROCK. CHEMICAL ECONOMICS HANDBOOK, MARCH 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: REDEYEF
SEQUENCE NUMBER: 7230300004

NATION: TUNISIA
SUBDIVISION: GAFSA
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 34 DEG 22 MIN 00 SEC
LONGITUDE: E 08 DEG 25 MIN 00 SEC
UTM - ZONE: 32 HEMISPHERE: NORTHERN
NORTHING: 3802770 EASTING: 446361
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 700 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP
CIE DES PHOSPHATES DE GAFSA (GOVT.)

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMAION

	RECORD 1
MEASURED	62,300,000
INDICATED	137,700,000
UNITS	MT ORE
YEAR/DATA	1981

RESERVE-RESOURCE REMARKS

SOURCE FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. 1981 E/MJ INTERNATIONAL DIRECTORY OF MINING. 1981, P. 370.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1899

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 100 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE THICKNESS: 1.8 METERS
STRIKE/DIP: N90E/20S

LITHOLOGY:
NAME OF FORMATION: METLAOUI FORMATION GEOLOGIC AGE: EOCENE
DEFORMATION DESCRIPTION: MINOR FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: ROOM AND PILLAR
CAPACITY: 3800 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: TUNISIA
LATITUDE: N 34 22 00 LONGITUDE: E 08 25 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: CONVEYOR
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: TUNISIA
LATITUDE: N 34 22 00 LONGITUDE: E 08 25 00

BENEFICIATION:
METHOD: CLASSIFIER
DESIGN CAPACITY: 3800
UNITS: MT ORE/DAY

-------DESCRIPTION OF MILLING-------
ORE/CRUSH/DRY/SCREEN/AIR CLASSIFY/
STOCKPILE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	67	30.23	WT-PCT

BIBLIOGRAPHY RECORDS

AMERICAN EMBASSY TUNISIA. INDUSTRIAL OUTLOOK REPORT. JUNE 9, 1980.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. FOURTH EDITION, 1980.

DEVOTO, R.H., AND D.N. STEVENS. URANIFEROUS PHOSPHATE DEPOSITS AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, JUNE 1979.

ENGINEERING AND MINING JOURNAL. TUNISIA BANKS ON NEW TECHNOLOGY; P205 PRODUCTION GOALS. SEPT. 1980.

ENGINEERING AND MINING JOURNAL. TUNISIA; PLANT TO DOUBLE PHOSPHATE PRODUCTION. MAY 1976.

ENGINEERING AND MINING JOURNAL. 1981 E/MJ INTERNATIONAL DIRECTORY OF MINING. 1981, P. 370.

INTERNATIONAL GEOLOGICAL CONGRESS. LES RESERVES MONDIALES EN PHOSPHATES. 14TH, 2 VOLUMES, 1926.

SRI INTERNATIONAL. PHOSPHATE ROCK. CHEMICAL ECONOMICS HANDBOOK, MARCH 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MOULARES/M'RATA
SEQUENCE NUMBER: 7230300005

NATION: TUNISIA
SUBDIVISION: GAFSA
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 34 DEG 29 MIN 00 SEC
LONGITUDE: E 08 DEG 16 MIN 00 SEC
UTM - ZONE: 32 HEMISPHERE: NORTHERN
NORTHING: 3815797 EASTING: 432662
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 300 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
STATE LANDS

OWNERSHIP
CIE DES PHOSPHATES DE GAFSA (GOVT.)

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1	RECORD 2
MEASURED	15,300,000	47,000,000
INDICATED	4,200,000	------
INFERRED	4,500,000	------
UNITS	MT ORE	MT ORE
YEAR/DATA	1981	1981

RESERVE-RESOURCE - REMARKS

RECORD 1: PERTAINS TO MOULARES MINE
RECORD 2: PERTAINS TO M'RATA MINE

SOURCE FOR RECORDS 1 AND 2:
ENGINEERING AND MINING JOURNAL. 1981 E/MJ INTERNATIONAL DIRECTORY OF MINING. 1981, P. 370.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1895
YEAR OF INITIAL PRODUCTION: 1905

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 100 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE THICKNESS: 4 METERS
STRIKE/DIP: N90E/10N

LITHOLOGY:
NAME OF FORMATION: METLAOUI FORMATION GEOLOGIC AGE: EOCENE
DEFORMATION DESCRIPTION: MINOR FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: ROOM AND PILLAR
CAPACITY: 6100 UNITS: MT ORE/DAY
ROCK AND WATER CONDITIONS: SOFT NONPLASTIC WITH LITTLE WATER
ROCK/MINE SUPPORT: UNSUPPORTING MAY SLOUGH; POST, HEADBOARD, CAPS, ROOF BOLTS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: TUNISIA
LATITUDE: N 34 29 00 LONGITUDE: E 08 16 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 2
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: TUNISIA
LATITUDE: N 34 29 00 LONGITUDE: E 08 16 00

BENEFICIATION:
METHOD: WASHING
DESIGN CAPACITY: 6100
UNITS: MT ORE/DAY

-------DESCRIPTION OF MILLING-------
ORE/DRY/CRUSH/SCREEN/AIR CLASSIFY/ STOCKPILE -OR- ORE/SCREEN/CRUSH/ SCRUB/DESLIME/FILTER/DRY/STOCKPILE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	73	30.23	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: TUNISIA
LATITUDE: N 34 29 00 LONGITUDE: E 08 16 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: CHEMICAL PLANT LOCATION: GABES, TUNISIA

BIBLIOGRAPHY RECORDS

AMERICAN EMBASSY TUNISIA. INDUSTRIAL OUTLOOK REPORT. JUNE 9, 1980.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. FOURTH EDITION, 1980.

CUMMINS, A.B. AND I.A. GIVEN. SME MINING ENGINEERING HANDBOOK. VOL. 1, PP. 12-13 THROUGH 12-31, 11-60 THROUGH 11-78, 1973.

DEVOTO, R.H., AND D.N. STEVENS. URANIFEROUS PHOSPHATE DEPOSITS AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, JUNE 1979.

ENGINEERING AND MINING JOURNAL. TUNISIA BANKS ON NEW TECHNOLOGY; P205 PRODUCTION GOALS. SEPT. 1980.

ENGINEERING AND MINING JOURNAL. TUNISIA; PLANT TO DOUBLE PHOSPHATE PRODUCTION. MAY 1976.

ENGINEERING AND MINING JOURNAL. 1981 E/MJ INTERNATIONAL DIRECTORY OF MINING. 1981, P. 370.

INDUSTRIAL MINERALS. COMPANIE DES PHOSPHATES DE GAFSA OF TUNISIA. FEB. 1981.

INTERNATIONAL GEOLOGICAL CONGRESS. LES RESERVES MONDIALES EN PHOSPHATES. 14TH, 2 VOLUMES, 1926.

SRI INTERNATIONAL. PHOSPHATE ROCK. CHEMICAL ECONOMICS HANDBOOK, MARCH 1980.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SEHIB
SEQUENCE NUMBER: 7230300007

NATION: TUNISIA
SUBDIVISION: GAFSA
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 34 DEG 15 MIN 00 SEC
LONGITUDE: E 08 DEG 12 MIN 00 SEC
UTM - ZONE: 32 HEMISPHERE: NORTHERN
NORTHING: 3789970 EASTING: 426336
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 300 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
SECTOR 100
DJELLABIA

OWNERSHIP
CIE DES PHOSPHATES DE GAFSA (GOVT.)
STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE
MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
UNDIFFERENTIATED	65,200,000
UNITS	MT ORE
YEAR/DATA	1981

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. 1981 E/MJ INTERNATIONAL DIRECTORY OF MINING. 1981, P. 370.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1899
YEAR OF INITIAL PRODUCTION: 1971

-------EXPLORATION METHODS-------
CORE DRILLING/TRENCHING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 200 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE THICKNESS: 2 METERS
STRIKE/DIP: N90E/10N

LITHOLOGY:
NAME OF FORMATION: METLAOUI FORMATION GEOLOGIC AGE: EOCENE
DEFORMATION DESCRIPTION: MINOR FOLDING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
ROCK TYPE:

PHOSPHORITE	IS ORE
LIMESTONE	LIES OVER ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: LONGWALL CAVING
CAPACITY: 4100 UNITS: MT ORE/DAY
ROCK AND WATER CONDITIONS: SOFT NONPLASTIC WITH LITTLE WATER
ROCK/MINE SUPPORT: TIMBER
CONDITION OF WORKINGS: OPEN
TOTAL LENGTH OF WORKINGS: 4840 METERS
INCLINES - NUMBER: 6 SLOPE: 10 DEGREES
SHAFTS - NUMBER: 2 AVERAGE DEPTH: 200 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: TUNISIA
LATITUDE: N 34 15 00 LONGITUDE: E 08 12 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: CONVEYOR DISTANCE (KM): 5
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: TUNISIA
LATITUDE: N 34 15 00 LONGITUDE: E 08 12 00

BENEFICIATION:
METHOD: WASHING ---------DESCRIPTION OF MILLING-------
DESIGN CAPACITY: 4100 ORE/CRUSH/SCRUB/SCREEN/SIZE/CYCLONE
UNITS: MT ORE/DAY DESLIME/FILTER/DRY/STORE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	70	30.23	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: TUNISIA
LATITUDE: N 34 15 00 LONGITUDE: E 08 12 00
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 250
DESTINATION FACILITY: CHEMICAL PLANT LOCATION: SFAX, TUNISIA

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: TUNISIA
LATITUDE: N 34 15 00 LONGITUDE: E 08 12 00
METHOD OF TRANSPORTATION: RAIL DISTANCE (KM): 300
DESTINATION FACILITY: CHEMICAL PLANT LOCATION: GABES, TUNISIA

BIBLIOGRAPHY RECORDS

AMERICAN EMBASSY TUNISIA. INDUSTRIAL OUTLOOK REPORT. JUNE 9, 1980.

BRITISH SULPHUR CORP., LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. FOURTH EDITION, 1980.

DEVOTO, R. H., AND D. N. STEVENS. URANIFEROUS PHOSPHATE DEPOSITS AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, JUNE 1979.

ENGINEERING AND MINING JOURNAL. TUNISIA BANKS ON NEW TECHNOLOGY; P205 PRODUCTION GOALS. SEPT. 1980.

ENGINEERING AND MINING JOURNAL. TUNISIA; PLANT TO DOUBLE PHOSPHATE PRODUCTION. MAY 1976.

ENGINEERING AND MINING JOURNAL. 1981 E/MJ INTERNATIONAL DIRECTORY OF MINING. 1981, P. 370.

INTERNATIONAL GEOLOGICAL CONGRESS. LES RESERVES MONDIALES EN PHOSPHATES. 14TH, 2 VOLUMES, 1926.

SRI INTERNATIONAL. PHOSPHATE ROCK. CHEMICAL ECONOMICS HANDBOOK, MARCH 1980.

TURKEY

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MAZIDAG
SEQUENCE NUMBER: 4890470001

NATION: TURKEY
SUBDIVISION: MARDIN
TYPE OF OPERATION: SURFACE
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: N 37 DEG 30 MIN 00 SEC
LONGITUDE: E 40 DEG 30 MIN 00 SEC
UTM - ZONE: 37 HEMISPHERE: NORTHERN
NORTHING: 4151193 EASTING: 632592
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 1000 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP
  ETIBANK (GOVERNMENT-OWNED)

STATUS
  OWNER-OPERATOR

COMMODITY
  PHOSPHATE

MARKETABILITY
  PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
  ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1960
YEAR OF INITIAL PRODUCTION: 1977

-------EXPLORATION METHODS-------
CORE DRILLING/TEST SHAFT/
TEST ADIT/TRENCHING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: FOLDING

MINERALIZED ZONE:
  AVERAGE DEPTH: 15 METERS
  AVERAGE THICKNESS: 1.8 METERS

LITHOLOGY:
  NAME OF FORMATION: UPPER MARDIN FORMATION GEOLOGIC AGE: UPPER CRETACEOUS
  DEFORMATION DESCRIPTION: MINOR FOLDING; FAULTING
  RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
  ROCK TYPE:

LIMESTONE	LIES OVER ORE; LIES UNDER ORE
CHERT	LIES OVER ORE; LIES UNDER ORE
PHOSPHORITE	IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
CALCITE	CARBONATES
URANINITE	OXIDES (EXCLUDING SIO2)
DAHLLITE	PHOSPHATES

MINE/MILL INFORMATION

PILOT PLANT

SURFACE MINING:
METHOD: STRIPPING
DESCRIPTION OF COVER:
SAND, SILT;
HARD ROCKS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE — LOCATION: TURKEY
LATITUDE: N 37 30 00 — LONGITUDE: E 40 30 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK — DISTANCE (KM): 2
DESTINATION FACILITY: MILL (ON-SITE) — LOCATION: TURKEY
LATITUDE: N 37 30 00 — LONGITUDE: E 40 30 00

BENEFICIATION:
METHOD: SIZING

------- DESCRIPTION OF MILLING -------
ORE/ CRUSH/SCREEN/CULL/DRY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	48	30	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) — LOCATION: TURKEY
LATITUDE: N 37 30 00 — LONGITUDE: E 40 30 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK — DISTANCE (KM): 220
DESTINATION FACILITY: REFINERY — LOCATION: ELAZIG, TURKEY

BIBLIOGRAPHY RECORDS

AYISKAN, OZER. BENEFICIATION OF TURKISH PHOSPHATES. MTA TECHNOLOGY DEPARTMENT, ANKARA, N. D.

AYISKAN, OZER. LES MINERAIS DE PHOSPHATE DE LA TURQUIE ET LES RECHERCHES FAITES EN VISE DE LEUR VALORISATION. SEMINAR ON BENEFICIATION ON LEAN PHOSPHATES WITH CARBONATE GANGUE, CAGLIARI, SARDINIA, 23-24 APRIL, 1975.

BRITISH SULPHUR CORPORATION, LTD. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, 1980.

CETINCELIK, MUAMMER AND EVCIMEN, TURHAN HIFZI. THE TURKISH MINING INDUSTRY: PAST, PRESENT AND FUTURE. WORLD MINING, SEPTEMBER, 1979, PP. 70-72.

DE VOTO, R AND D. N. STEVENS. URANIFEROUS PHOSPHATE RESOURCES THE UNITED STATES AND THE FREE WORLD. U S DEPARTMENT OF ENERGY CONTRACT, GJBX 110 (79), GRAND JUNCTION, COLORADO, 1979, PP. 437-438.

ENGINEERING & MINING JOURNAL. PHOSPHATE. JAN. 1979, P. 110. MINING ANNUAL REVIEW, 1980.

SEYHAN, I. PHOSPHATE DEPOSITS OF TURKEY, GEOLOGY, MINING BENEFICIATION AND PRODUCTION. ISMA REGIONAL MEETING, KUWAIT, FEBRUARY, 1981

U. S. BUREAU OF MINES. REPORT AND RECOMMENDATIONS ON PHOSPHATE DEVELOPMENT IN TURKEY (PROCESSING). JUNE 1978.

U.S.S.R.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: KOASHVA
SEQUENCE NUMBER: 4610000028

NATION: USSR
TYPE OF OPERATION: UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 67 DEG 45 MIN 00 SEC
LONGITUDE: E 33 DEG 44 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 7514991 EASTING: 530988
POINT OF REFERENCE: ORE BODY
ELEVATION: 1100 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
- NIORPAKH
- APATIT COMBINE
- KHIBINY MASSIF
- VOSTOCHNY

OWNERSHIP	STATUS
APATIT PRODUCTION ASSOC./KOLA COMBINE (GOVT. BUREAU)	OPERATOR
GOVERNMENT OF U.S.S.R.	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1926
YEAR OF INITIAL PRODUCTION: 1980

-------EXPLORATION METHODS-------
CORE DRILLING/GEOPHYSICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: PHOSPHATE-BEARING LAYERS WITHIN A SYENITE PLUTON
SHAPE OF ORE BODY: TABULAR; MASSIVE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
- AVERAGE DEPTH: 200 METERS
- AVERAGE THICKNESS: 200 METERS

LITHOLOGY:
- DEFORMATION DESCRIPTION: INTRUSION
- GEOLOGIC AGE: PALEOZOIC
- ROCK TYPE:
  - SYENITE ENCLOSES ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

MINE/MILL INFORMATION

UNDERGROUND MINING:
METHOD: SHRINKAGE METHODS
CAPACITY: 10800 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 45 00 LONGITUDE: E 33 44 00
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 42 00 LONGITUDE: E 33 24 00

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 45 00 LONGITUDE: E 33 44 00
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 40 00 LONGITUDE: E 33 35 00

BENEFICIATION:
METHOD: FLOTATION -------DESCRIPTION OF MILLING-------
ORE/CRUSH/GRIND/FLOAT

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	89	39.5	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: FOB MILL

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980, LONDON.

DZHUMALIEV, T. D. PHOSPHORITE-BEARING DEPOSITS AT THE BASE OF THE SHABAKTY FORMATION OF THE MALYI KARATAU IN KAZAKHSTAN. LITOLOGIYA: POLEZMJE ISKAPAENIYE, 3, 1972, PP. 76-85. TRANSLATIONS AVAILABLE FROM CONSULTANTS BUREAU, PLENUM PRESS, NEW YORK.

ENGINEERING AND MINING JOURNAL. SOVIET UNION EXPANDING MINERALS INDUSTRY. JULY, 1973.

ENGINEERING AND MINING JOURNAL. SOVIET BUREAUCRATS SQUABBLE OVER USE OF PHOSPHATE ROCK. APRIL, 1980.

ENGINEERING AND MINING JOURNAL. RUSSIAN MINING SECTOR PROBLEMS NEGLECTED BY BUREAUCRATS. PRAVDA, DECEMBER, 1980, P. 13.

ISMA. NEWS ITEM REGARDING PHOSPHATES AT OKTYNBINSK, U.S.S.R. 1981.

MINING ANNUAL REVIEW. EASTERN EUROPE PHOSPHATE. 1981, PP. 590-591.

MINING MAGAZINE. SUB-LEVEL CAVING IN SOVIET APATITE-NEPHELINE ORE. NOVEMBER, 1975, P. 405.

NOTHOLT, A. J. G. THE ECONOMIC GEOLOGY AND DEVELOPMENT OF IGNEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE U.S.S.R. ECONOMIC GEOLOGY, 74, 1979, PP. 339-350.

PHOSPHORUS & POTASSIUM. NEWS ITEM REGARDING U.S.S.R. NO. 94 (3/4), 1978.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-I. NO. 102 (7/8), 1979A, PP. 16-17, 19-20.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-II. NO. 103 (9/10), 1979B, PP. 21-23, 43.

STRISHKOV, E. M. MINERAL INDUSTRIES OF THE U.S.S.R. BUREAU OF MINES, U.S. DEPT. OF INTERIOR, PUBLICATION MP-2, 1977, 19 PP.

ZELLARS, M. E., AND J. M. WILLIAMS. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. FINAL REPORT. PREPARED FOR THE BUREAU OF MINES, U.S. DEPT. OF THE INTERIOR, CONTRACT NO. J0377000, ZELLARS-WILLIAMS, INC., LAKELAND, FLORIDA, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: TSENTRALNYY
SEQUENCE NUMBER: 4610000029

NATION: USSR
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 67 DEG 45 MIN 00 SEC
LONGITUDE: E 33 DEG 44 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 7514991 EASTING: 530988
POINT OF REFERENCE: ORE BODY
ELEVATION: 1100 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
TSENTRALNY
KOLA COMBINE
APATITE CIRCUS
KHIBINY MASSIF

OWNERSHIP
GOVERNMENT OF U.S.S.R.
APATIT PRODUCTION ASSOC./
KOLA COMBINE (GOVT. BUREAU)

STATUS
OWNER
OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1926
YEAR OF INITIAL PRODUCTION: 1964

-------EXPLORATION METHODS-------
CORE DRILLING/GEOPHYSICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: PHOSPHATE-BEARING LAYERS WITHIN A SYENITE PLUTON
SHAPE OF ORE BODY: TABULAR; MASSIVE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
AVERAGE DEPTH: 200 METERS
AVERAGE THICKNESS: 200 METERS

LITHOLOGY:
DEFORMATION DESCRIPTION: INTRUSION
GEOLOGIC AGE: PALEOZOIC
ROCK TYPE:
SYENITE ENCLOSES ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
  METHOD: OPEN-PIT
  CAPACITY: 70800 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
  ORIGINATING FACILITY: MINE LOCATION: KOLA PENINSULA (USSR)
  LATITUDE: N 67 45 00 LONGITUDE: E 33 44 00
  METHOD OF TRANSPORTATION: TRUCK
  DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
  LATITUDE: N 67 42 00 LONGITUDE: E 33 24 00

TRANSPORTATION (ORE):
  ORIGINATING FACILITY: MINE LOCATION: KOLA PENINSULA (USSR)
  LATITUDE: N 67 45 00 LONGITUDE: E 33 44 00
  METHOD OF TRANSPORTATION: TRUCK
  DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
  LATITUDE: N 67 40 00 LONGITUDE: E 33 35 00

BENEFICIATION:
  METHOD: FLOTATION -------DESCRIPTION OF MILLING-------
  ORE/CRUSH/GRIND/FLOAT

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	81	39.5	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
  ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: RAIL
  DESTINATION FACILITY: FOB MILL

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. LONDON, 1980.

DZHUMALIEV, T. D. PHOSPHORITE-BEARING DEPOSITS AT THE BASE OF THE SHABAKTY FORMATION OF THE MALYI KARATAU IN KAZAKHSTAN. LITOLOGIYA: POLEZNYE ISKAPAENIYE, 3, 1972, PP. 76-85. TRANSLATIONS AVAILABLE FROM CONSULTANTS BUREAU, PLENUM PRESS, NEW YORK.

ENGINEERING AND MINING JOURNAL. SOVIET UNION EXPANDING MINERALS INDUSTRY. JULY, 1973.

ENGINEERING AND MINING JOURNAL. SOVIET BUREAUCRATS SQUABBLE OVER USE OF PHOSPHATE ROCK. APRIL, 1980.

ENGINEERING AND MINING JOURNAL. RUSSIAN MINING SECTOR PROBLEMS NEGLECTED BY BUREAUCRATS. PRAVDA, DECEMBER, 1980, P. 13.

ISMA. NEWS ITEM REGARDING PHOSPHATES AT OKTYNBINSK, U.S.S.R. 1981.

MINING ANNUAL REVIEW. EASTERN EUROPE PHOSPHATE. 1981, PP. 590-591.

MINING MAGAZINE. SUB-LEVEL CAVING IN SOVIET APATITE-NEPHELINE ORE. NOVEMBER, 1975, P. 405.

NOTHOLT, A. J. G. THE ECONOMIC GEOLOGY AND DEVELOPMENT OF IGNEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE U.S.S.R. ECONOMIC GEOLOGY, 74, 1979, PP. 339-350.

PHOSPHORUS & POTASSIUM. NEWS ITEM REGARDING U.S.S.R. NO. 94 (3/4), 1978.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-I. NO. 102 (7/8), 1979A, PP. 16-17, 19-20.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-II. NO. 103 (9/10), 1979B, PP. 21-23, 43.

STRISHKOV, E. M. MINERAL INDUSTRIES OF THE U.S.S.R. BUREAU OF MINES, U.S. DEPT. OF INTERIOR, PUBLICATION MP-2. 1977, 19 PP.

ZELLARS, M. E., AND J. M. WILLIAMS. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. FINAL REPORT. PREPARED FOR THE BUREAU OF MINES, U.S. DEPT. OF THE INTERIOR, CONTRACT NO. J0377000, ZELLARS-WILLIAMS, INC., LAKELAND, FLORIDA, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MOSCOW REGION
SEQUENCE NUMBER: 4610000030

NATION: USSR
SUBDIVISION: UNKNOWN
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 55 DEG 20 MIN 00 SEC
LONGITUDE: E 39 DEG 00 MIN 00 SEC
UTM - ZONE: 37 HEMISPHERE: NORTHERN
NORTHING: 6131670 EASTING: 500000
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
- YEGORIEVSK MINE
- LEPATINSK MINE
- VOSKRESENSK MINE
- PODMOSKOVSK

OWNERSHIP
- GOVERNMENT OF U.S.S.R.

STATUS
- OWNER-OPERATOR

COMMODITY
- PHOSPHATE

MARKETABILITY
- PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

YEAR OF INITIAL PRODUCTION: 1920

---------EXPLORATION METHODS---------
GEOPHYSICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR

LITHOLOGY:
- GEOLOGIC AGE: UPPER JURASSIC
- ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	NEAR ORE; ENCLOSES ORE
CLAY	NEAR ORE; ENCLOSES ORE
COQUINA	NEAR ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
GLAUCONITE	SILICATES

MINE/MILL INFORMATION

TWO MINES FEEDING ONE MILL.

SURFACE MINING:
METHOD: OPEN-PIT

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE — LOCATION: USSR
LATITUDE: N 55 20 00 — LONGITUDE: E 39 00 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: MILL (OFF-SITE) — LOCATION: PODMOSKOVSK-U.S.S.R.
LATITUDE: N 55 23 00 — LONGITUDE: E 39 02 00

BENEFICIATION:
METHOD: FLOTATION ---------- DESCRIPTION OF MILLING -------
ORE/GRINDING/FLOTATION/PRODUCT

PRODUCT	ASSAY FORM	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	26.75	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE) — LOCATION: PODMOSKOVSK-U.S.S.R.
LATITUDE: N 55 23 00 — LONGITUDE: E 39 02 00
PERCENT SHIPPED: 100
DESTINATION FACILITY: MARKET

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. LONDON, 1980.

OXFORD WORLD ATLAS. OXFORD UNIVERSITY PRESS, 1973.

SHABAD, T. BASIC INDUSTRIAL RESOURCES OF THE U.S.S.R. COLUMBIA UNIVERSITY PRESS, NEW YORK AND LONDON, 1969, P. 101.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: MOLODEZHNYY (RASVUMCHORR) SEQUENCE NUMBER: 4610000033

NATION: USSR
TYPE OF OPERATION: SURFACE-UNDERGROUND CURRENT STATUS: PRODUCER
LATITUDE: N 67 DEG 45 MIN 00 SEC LONGITUDE: E 33 DEG 44 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN NORTHING: 7514991 EASTING: 530988
POINT OF REFERENCE: ORE BODY
ELEVATION: 1100 METERS PRECISION: 100 METERS
DATUM: SEA LEVEL YEAR OF INFORMATION: 1981

ALTERNATE NAMES
- RASVUMCHORR PLATEAU
- KHIBINY MASSIF
- APATIT COMBINE
- APATIT PRODUCTION ASSOCIATION
- KOLA COMBINE

OWNERSHIP
- GOVERNMENT OF U.S.S.R.
- APATIT PRODUCTION ASSOC.
  - KOLA COMBINE (GOVT. BUREAU)

STATUS
- OWNER
- OPERATOR

COMMODITY
- PHOSPHATE

MARKETABILITY
- PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1926 -------EXPLORATION METHODS-------
YEAR OF INITIAL PRODUCTION: 1955 CORE DRILLING/GEOPHYSICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: PHOSPHATE-BEARING LAYERS WITHIN A SYENITE PLUTON
SHAPE OF ORE BODY: TABULAR; MASSIVE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
- AVERAGE DEPTH: 200 METERS AVERAGE THICKNESS: 200 METERS

LITHOLOGY:
- DEFORMATION DESCRIPTION: INTRUSION
  - GEOLOGIC AGE: PALEOZOIC
- ROCK TYPE:
  - SYENITE ENCLOSES ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 4100 UNITS: MT ORE/DAY

UNDERGROUND MINING:
METHOD: BLOCK CAVING
CAPACITY: 14400 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 45 00 LONGITUDE: E 33 44 00
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 42 00 LONGITUDE: E 33 24 00

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 45 00 LONGITUDE: E 33 44 00
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 40 00 LONGITUDE: E 33 35 00

BENEFICIATION:
METHOD: FLOTATION -------DESCRIPTION OF MILLING-------
ORE/CRUSH/GRIND/FLOAT

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	82	39.5	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: MARKET

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. LONDON, 1980.

DZHUMALIEV, T. D. PHOSPHORITE-BEARING DEPOSITS AT THE BASE OF THE SHABAKTY FORMATION OF THE MALYI KARATAU IN KAZAKHSTAN. LITOLOGIYA: POLEZMJE ISKAPAENIYE, 3, 1972, PP. 76-85. TRANSLATIONS AVAILABLE FROM CONSULTANTS BUREAU, PLENUM PRESS, NEW YORK.

ENGINEERING AND MINING JOURNAL. SOVIET UNION EXPANDING MINERALS INDUSTRY. JULY, 1973.

ENGINEERING AND MINING JOURNAL. SOVIET BUREAUCRATS SQUABBLE OVER USE OF PHOSPHATE ROCK. APRIL, 1980A.

ENGINEERING AND MINING JOURNAL. RUSSIAN MINING SECTOR PROBLEMS NEGLECTED BY BUREAUCRATS. PRAVDA, DECEMBER, 1980, P. 13.

ISMA. NEWS ITEM REGARDING PHOSPHATES AT OKTYNBINSK, U.S.S.R. 1981.

MINING ANNUAL REVIEW. EASTERN EUROPE PHOSPHATE. 1981, PP. 590-591.

MINING MAGAZINE. SUB-LEVEL CAVING IN SOVIET APATITE-NEPHELINE ORE. NOVEMBER, 1975, P. 405.

NOTHOLT, A. J. G. THE ECONOMIC GEOLOGY AND DEVELOPMENT OF IGNEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE U.S.S.R. ECONOMIC GEOLOGY, 74, 1979, PP. 339-350.

PHOSPHORUS & POTASSIUM. NEWS ITEM REGARDING U.S.S.R. NO. 94 (3/4), 1978.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-I. NO. 102 (7/8), 1979A, PP. 16-17, 19-20.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-II. NO. 103 (9/10), 1979B, PP. 21-23, 43.

STRISHKOV, E. M. MINERAL INDUSTRIES OF THE U.S.S.R. BUREAU OF MINES, U.S. DEPT. OF INTERIOR, 1977, PUBLICATION MP-2. 19 PP.

ZELLARS, M. E., AND J. M. WILLIAMS. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. FINAL REPORT. PREPARED FOR THE BUREAU OF MINES, U.S. DEPT. OF THE INTERIOR, CONTRACT NO. J0377000, ZELLARS-WILLIAMS, INC., LAKELAND, FLORIDA, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: OSHURKOV
SEQUENCE NUMBER: 4610120008

NATION: USSR
SUBDIVISION: BURYATSKAYA A.S.S.R.
TYPE OF OPERATION: SURFACE
CURRENT STATUS: DEVELOPING DEPOSIT
LATITUDE: N 51 DEG 44 MIN 00 SEC
LONGITUDE: E 107 DEG 30 MIN 00 SEC
UTM - ZONE: 48 HEMISPHERE: NORTHERN
NORTHING: 5734119 EASTING: 672637
POINT OF REFERENCE: ORE BODY
ELEVATION: 750 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
OSHURKOV PHOSPHATE MINE

OWNERSHIP	STATUS
PRODUCTION UNION ZABAYKALSKIY (USSR - STATE OWNED)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INDICATED	500,000,000
UNITS	MT ORE
YEAR/DATA	1979

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	4.7	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
NORTHOLT, ARTHUR J.G. THE ECONOMIC GEOLOGY AND DEVELOPMENT OF IGNEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE U.S.S.R. ECONOMIC GEOLOGY, 74 (2), 1979, PP. 339-350.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1962

-------EXPLORATION METHODS-------
GEOPHYSICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: REPLACEMENT
MODE OF ORIGIN: CONTACT METASOMATIC
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
MINIMUM DEPTH: 0 METERS
AVERAGE WIDTH: 1000 METERS
AVERAGE LENGTH: 3500 METERS
AVERAGE THICKNESS: 100 METERS

LITHOLOGY:
NAME OF FORMATION: OSHURKOV COMPLEX
DEFORMATION DESCRIPTION: METAMORPHISM; INTRUSION
GEOLOGIC AGE: PRECAMBRIAN
ROCK TYPE:
DIORITE ENCLOSES ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980, LONDON.

CONGER, D. SIBERIA: RUSSIA'S FROZEN FRONTIER. NATIONAL GEOGRAPHIC, 131 (3), 1967, PP. 297-347.

ISMA-SINGAPORE. NEWS ITEM ON OSHURKOV MINE. 1981.

MINERALS YEARBOOK. PHOSPHATE. U.S.S.R. 1975, P. 1028.

NOTHOLT, A. J.G. THE ECONOMIC GEOLOGY AND DEVELOPMENT OF IGNEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE U.S.S.R. ECONOMIC GEOLOGY, 74 (2), 1979, PP. 339-350.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN THE 10TH FYP-I. NO. 102, JULY/AUGUST 1979, PP. 16-17, 19-20, .

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN THE 10TH FYP-II. NO. 103, SEPT./OCT. 1979, PP. 21-23, 43.

PHOSPHORUS & POTASSIUM. NEWS ITEM ON THE U.S.S.R. ZABAYKALSKIY APATITE COMPLEX, NO. 109, 1980, SEPT./OCT. 1980.

STEWART, J. M. SIBERIA, OPTIMA, 26 (2), 1976, PP. 85-104.

U.S.S.R. GEOLOGICAL CHARACTERISTICS OF COMMERCIAL DEPOSITS OF MAIN KINDS OF MINERAL RAW MATERIALS FOR FERTILIZERS IN THE U.S.S.R. IN: PROCEEDINGS OF THE SEMINAR ON SOURCES OF RAW MATERIALS FOR THE FERTILIZER INDUSTRY IN ASIA AND THE FAR EAST. ECAFE MINERAL RESOURCES DEVELOPMENT SERIES, NO. 32, PART 2, DOCUMENTATION, 1968, C-11. PP. 100-104.

ZELLARS, MICHAEL E. AND J.M. WILLIAMS. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. PREPARED FOR U.S. DEPT. OF INTERIOR, BUREAU OF MINES, CONTRACT NO. J0377000, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: KARA TAU DEPOSITS
SEQUENCE NUMBER: 4610150007

NATION: USSR
SUBDIVISION: CHITA A.S.S.R.
TYPE OF OPERATION: SURFACE-UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 43 DEG 20 MIN 00 SEC
LONGITUDE: E 70 DEG 15 MIN 00 SEC
UTM - ZONE: 42 HEMISPHERE: NORTHERN
NORTHING: 4798375 EASTING: 601336
POINT OF REFERENCE: ORE BODY
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
AK SAI
CHULUK TAU
DZANATASS
KOK DZHON
KOK SU

OWNERSHIP
KARATAU COMBINE (USSR - STATE OWNED)

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	264,000,000
INDICATED	536,000,000
INFERRED	640,000,000
UNITS	MT ORE
YEAR/DATA	1977

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
STRISHKOV, E.M. MINERAL INDUSTRIES OF THE U.S.S.R. BUREAU OF MINES, U.S. DEPT. OF INTERIOR, PUBLICATION MP-2, 1977, 19 PP.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1936
YEAR OF INITIAL PRODUCTION: 1942

--------EXPLORATION METHODS--------
GEOPHYSICAL/STREAM SEDIMENT SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE LENGTH: 5000 METERS
AVERAGE WIDTH: 430 METERS
AVERAGE THICKNESS: 10 METERS
STRIKE/DIP: N45W/85N

LITHOLOGY:
NAME OF FORMATION: CHULUK TAU GEOLOGIC AGE: MIDDLE CAMBRIAN
ROCK TYPE:
UNSPECIFIED SEDIMENTARY IS ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 29600 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: KARA TAU MT. RANGE
LATITUDE: N 43 20 00 LONGITUDE: E 70 15 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: KARA TAU CITY, USSR

UNDERGROUND MINING:
METHOD: OPEN STOPE METHODS
CAPACITY: 7400 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: KARA TAU MT. RANGE
LATITUDE: N 43 20 00 LONGITUDE: E 70 15 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: KARA TAU CITY, USSR

BENEFICIATION:
METHOD: FLOTATION -------DESCRIPTION OF MILLING-------
DESIGN CAPACITY: 37000 ORE/CRUSH/GRIND/FLOAT
UNITS: MT ORE/DAY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	60	28	WT-PCT

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. LONDON, 1980.

DZHUMALIEV, T. D. PHOSPHORITE-BEARING DEPOSITS AT THE BASE OF THE SHABAKTY FORMATION OF THE MALYI KARATAU IN KAZAKHSTAN. LITOLOGIYA: POLEZMJE ISKAPAENIYE, 3, 1972, PP. 76-85. TRANSLATIONS AVAILABLE FROM CONSULTANTS BUREAU, PLENUM PRESS, NEW YORK.

ENGINEERING AND MINING JOURNAL. SOVIET UNION EXPANDING MINERALS INDUSTRY. JULY, 1973.

ENGINEERING AND MINING JOURNAL. SOVIET BUREAUCRATS SQUABBLE OVER USE OF PHOSPHATE ROCK. APRIL, 1980A.

ENGINEERING AND MINING JOURNAL. RUSSIAN MINING SECTOR PROBLEMS NEGLECTED BY BUREAUCRATS. PRAVDA, DECEMBER, 1980B, P. 13.

ISMA. NEWS ITEM REGARDING PHOSPHATES AT OKTYNBINSK, U.S.S.R. 1981.

MINING ANNUAL REVIEW. EASTERN EUROPE PHOSPHATE. 1981, PP. 590-591.

MINING MAGAZINE. SUB-LEVEL CAVING IN SOVIET APATITE-NEPHELINE ORE. NOVEMBER, 1975, P. 405.

NOTHOLT, A. J. G. THE ECONOMIC GEOLOGY AND DEVELOPMENT OF IGNEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE U.S.S.R. ECONOMIC GEOLOGY, 74, 1979, PP. 339-350.

PHOSPHORUS & POTASSIUM. NEWS ITEM REGARDING U.S.S.R. NO. 94 (3/4), 1978.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-I. NO. 102 (7/8), 1979A, PP. 16-17, 19-20.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-II. NO. 103 (9/10), 1979B, PP. 21-43.

STRISHKOV, E. M. MINERAL INDUSTRIES OF THE U.S.S.R. BUREAU OF MINES, U.S. DEPT. OF INTERIOR, PUBLICATION MP-2. 1977, 19 PP.

ZELLARS, M. E. AND J. M. WILLIAMS. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. FINAL REPORT. PREPARED FOR THE BUREAU OF MINES, U.S. DEPT. OF THE INTERIOR, CONTRACT NO. J0377000, 1978, ZELLARS-WILLIAMS, INC., LAKELAND, FLORIDA.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: CHILIKSAY
SEQUENCE NUMBER: 4610320029

NATION: USSR
SUBDIVISION: KAZAKISTAN
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 50 DEG 17 MIN 00 SEC
LONGITUDE: E 57 DEG 10 MIN 00 SEC
UTM - ZONE: 40 HEMISPHERE: NORTHERN
NORTHING: 5569928 EASTING: 511874
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 300 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
AKTYUBINSK

OWNERSHIP
GOVERNMENT OF U.S.S.R.

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INDICATED	269,000,000
INFERRED	731,000,000
UNITS	MT ORE
YEAR/DATA	1980

RESERVE-RESOURCE - REMARKS

RECORD 1: NO GRADE REPORTED.

SOURCE FOR RECORD 1:
BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. LONDON, 1980.

DEPOSIT HISTORICAL INFORMATION

YEAR OF DISCOVERY: 1929
YEAR OF INITIAL PRODUCTION: 1980

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 10 METERS
MINIMUM DEPTH: 5 METERS
AVERAGE THICKNESS: 0.6 METER

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 5 METERS

LITHOLOGY:
NAME OF FORMATION: BEDS OF SANTONIAN AGE GEOLOGIC AGE: UPPER CRETACEOUS
ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	LIES OVER ORE; LIES UNDER ORE
SILT	LIES OVER ORE
CLAY	LIES OVER ORE; NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS	GRAIN SIZE
COLLOPHANE	PHOSPHATES	VARIABLE
GLAUCONITE	SILICATES	VARIABLE

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 18200 UNITS: MT ORE/DAY
DESCRIPTION OF COVER:
SAND, SILT; QUICKSAND
AVERAGE COVER THICKNESS: 10 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: USSR
LATITUDE: N 50 17 00 LONGITUDE: E 57 10 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: USSR
LATITUDE: N 50 17 00 LONGITUDE: E 57 10 00

BENEFICIATION:
METHOD: FLOTATION
DESIGN CAPACITY: 18200
UNITS: MT ORE/DAY

------- DESCRIPTION OF MILLING -------
ORE/WASH/GRIND/FLOAT/FILTER/DRY/GRIND/
SHIP PRODUCT

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	73	23.5	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USSR
LATITUDE: N 50 17 00 LONGITUDE: E 57 10 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: MARKET LOCATION: USSR

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. LONDON, 1980.

DZHUMALIEV, T. D. PHOSPHORITE-BEARING DEPOSITS AT THE BASE OF THE SHABARTY FORMATION OF THE MALYI KARATAU IN KAZAKHSTAN. LITOLOGIYA: POLEZNYE ISKAPAEMYE, 3, 1972, PP. 76-85. TRANSLATIONS AVAILABLE FROM CONSULTANTS BUREAU, PLENUM PRESS, NEW YORK.

ENGINEERING & MINING JOURNAL. SOVIET UNION EXPANDING MINERALS INDUSTRY. JULY, 1973.

ENGINEERING & MINING JOURNAL. SOVIET BUREAUCRATS SQUABBLE OVER USE OF PHOSPHATE ROCK. APRIL, 1980.

ENGINEERING & MINING JOURNAL. RUSSIAN MINING SECTOR PROBLEMS NEGLECTED BY BUREAUCRATS. PRAVDA, DECEMBER, 1980, P. 13.

ISMA. NEWS ITEM REGARDING PHOSPHATES AT OKTYABINSK, U.S.S.R.

MINING ANNUAL REVIEW. EASTERN EUROPE PHOSPHATE, 1981, PP. 590-591.

MINING MAGAZINE. SUB-LEVEL CAVING IN SOVIET APATITE-NEPHELINE ORE. NOVEMBER, 1975, P. 405.

NOTHHOLT, A. J. G. THE ECONOMIC GEOLOGY AND DEVELOPMENT OF IGNEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE U.S.S.R. ECONOMIC GEOLOGY, 74, 1979, PP. 339-350.

PHOSPHORUS & POTASSIUM. NEWS ITEM REGARDING U.S.S.R. NO. 94 (3/4), 1978.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-I. NO. 102 (7/8), 1979A, PP. 16-17, 19-20.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-II. NO. 103 (9/10), 1979B, PP. 21-23, 43.

STRISHKOV, E. M. MINERAL INDUSTRIES OF THE U.S.S.R. BUREAU OF MINES, U.S. DEPT. OF INTERIOR, PUBLICATION MP-2. 1977, 19 P.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: KOVDOR
SEQUENCE NUMBER: 4610380025

NATION: USSR
SUBDIVISION: KOLA PENINSULA
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 67 DEG 34 MIN 00 SEC
LONGITUDE: E 30 DEG 22 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 7496750 EASTING: 387881
POINT OF REFERENCE: ORE BODY
ELEVATION: 750 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
KHIBNY MASSIF
APATIT PRODUCTION ASSOCIATION
KOLA COMBINE

OWNERSHIP	STATUS
GOVERNMENT OF U.S.S.R.	OWNER
APATIT PRODUCTION ASSOC./KOLA COMBINE (GOVT. BUREAU)	OPERATOR

COMMODITY	MARKETABILITY
MAGNETITE	PRIMARY PRODUCT
PHOSPHATE	BYPRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INDICATED	708,000,000
UNITS	MT ORE
YEAR/DATA	1979

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	6.6	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
NOTHOLT, ARTHUR J.G. THE ECONOMIC GEOLOGY AND DEVELOPMENT OF IGNEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE U.S.S.R. ECONOMIC GEOLOGY, 74 (2), 1979, PP. 339-350.

DEPOSIT HISTORICAL INFORMATION

YEAR OF INITIAL PRODUCTION: 1964

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

SHAPE OF ORE BODY: TABULAR; LENTICULAR
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
STRIKE/DIP: N01E/90

LITHOLOGY:
DEFORMATION DESCRIPTION: INTRUSION GEOLOGIC AGE: MIDDLE DEVONIAN
ROCK TYPE:
ALKALIC IGNEOUS ENCLOSES ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 10500 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 34 00 LONGITUDE: E 30 22 00
PERCENT SHIPPED: 100
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 34 00 LONGITUDE: E 30 22 00

BENEFICIATION:
METHOD: FLOTATION --------DESCRIPTION OF MILLING--------
DESIGN CAPACITY: 10500 ORE/MAGNETITE CONCENTRATION/FLOTATION/
UNITS: MT ORE/DAY FILTER/DRY/GRIND

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	74	35	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 34 00 LONGITUDE: E 30 22 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: RAIL LOCATION: LENINGRAD(USSR)

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980, LONDON.

DZHUMALIEV, T. D. PHOSPHORITE-BEARING DEPOSITS AT THE BASE OF THE SHABAKTY FORMATION OF THE MALYI KARATAU IN KAZAKHSTAN. LITOLOGIYA: POLEZ'NYE ISKAPAENIYE, 3, 1972, PP. 76-85. TRANSLATIONS AVAILABLE FROM CONSULTANTS BUREAU, PLENUM PRESS, NEW YORK.

ENGINEERING AND MINING JOURNAL. SOVIET UNION EXPANDING MINERALS INDUSTRY. JULY, 1973.

ENGINEERING AND MINING JOURNAL. SOVIET BUREAUCRATS SQUABBLE OVER USE OF PHOSPHATE ROCK. APRIL, 1980.

ENGINEERING AND MINING JOURNAL. RUSSIAN MINING SECTOR PROBLEMS NEGLECTED BY BUREAUCRATS. PRAVDA, DECEMBER, 1980, P. 13.

ISMA. NEWS ITEM REGARDING PHOSPHATES AT OKTYNBINSK, U.S.S.R. 1981.

MINING ANNUAL REVIEW. EASTERN EUROPE PHOSPHATE. 1981, PP. 590-591.

MINING MAGAZINE. SUB-LEVEL CAVING IN SOVIET APATITE-NEPHELINE ORE. NOVEMBER, 1975, P. 405.

NOTHOLT, A. J. G. THE ECONOMIC GEOLOGY AND DEVELOPMENT OF IGNEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE U.S.S.R. ECONOMIC GEOLOGY, 74, 1979, PP. 339-350.

PHOSPHORUS & POTASSIUM. NEWS ITEM REGARDING U.S.S.R. NO. 94 (3/4), 1978.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-I. NO. 102 (7/8), 1979, PP. 16-17, 19-20.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-II. NO. 103 (9/10), 1979, PP. 21-23, 43.

STRISHKOV, E. M. MINERAL INDUSTRIES OF THE U.S.S.R. BUREAU OF MINES, U.S. DEPT. OF INTERIOR, PUBLICATION MP-2. 1977, 19 PP.

ZELLARS, M. E., AND J. M. WILLIAMS. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. FINAL REPORT. PREPARED FOR THE BUREAU OF MINES, U.S. DEPT OF THE INTERIOR, CONTRACT NO. J0377000, ZELLARS-WILLIAMS, INC., LAKELAND, FLORIDA, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: VIATKA-KAMA
SEQUENCE NUMBER: 4610400001

NATION: USSR
SUBDIVISION: KOMI S.S.R.
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 57 DEG 55 MIN 00 SEC
LONGITUDE: E 57 DEG 55 MIN 00 SEC
UTM - ZONE: 40 HEMISPHERE: NORTHERN
NORTHING: 6419589 EASTING: 554310
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

OWNERSHIP
GOVERNMENT OF U.S.S.R.

STATUS
OWNER-OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INDICATED	1,000,000,000
UNITS	MT ORE
YEAR/DATA	1980

RESERVE-RESOURCE - REMARKS

RECORD 1: NO GRADE REPORTED.

SOURCE FOR RECORD 1:
BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, PP. 214, 218, AND 219.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOPHYSICAL ANOMALY
YEAR OF DISCOVERY: 1917

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR

MINERALIZED ZONE:
AVERAGE THICKNESS: 0.7 METER

LITHOLOGY:
  GEOLOGIC AGE: LOWER CRETACEOUS
  ROCK TYPE:

PHOSPHORITE	IS ORE
SAND	LIES OVER ORE; NEAR ORE
SILT	LIES OVER ORE
CLAY	LIES OVER ORE; LIES UNDER ORE
CHERT	NEAR ORE; ENCLOSES ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
GLAUCONITE	SILICATES
CHERT	FORMS OF SIO2
PYRITE	SULFIDES

MINE/MILL INFORMATION

SURFACE MINING:
  METHOD: OPEN-PIT

TRANSPORTATION (ORE):
  ORIGINATING FACILITY: MINE LOCATION: USSR
  LATITUDE: N 57 55 00 LONGITUDE: E 57 55 00
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: RAIL
  DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: USSR

BENEFICIATION:
  METHOD: FLOTATION
  --------- DESCRIPTION OF MILLING -------
  ORE/CRUSH/SCREEN/GRIND/FLOAT/FILTER/DRY/
  LOAD & TRANSPORT/MARKET

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	80	28	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
  ORIGINATING FACILITY: MILL (OFF-SITE)
  PERCENT SHIPPED: 100
  METHOD OF TRANSPORTATION: RAIL
  DESTINATION FACILITY: MARKET

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, PP. 214, 218, AND 219.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: KINGISEPP
SEQUENCE NUMBER: 4610480001

NATION: USSR
SUBDIVISION: LENINGRAD
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: N 58 DEG 45 MIN 00 SEC
LONGITUDE: E 27 DEG 30 MIN 00 SEC
UTM - ZONE: 35 HEMISPHERE: NORTHERN
NORTHING: 6512113 EASTING: 528935
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
LOCATED CLAIM; PATENTED CLAIM

ALTERNATE NAMES
KINGISEPP APATIT GROUP
MAARDU
TOOLSE
BALTIC REGION

OWNERSHIP
GOVERNMENT OF U.S.S.R.
KINGISEPP FOSFORITE ASSOC.

STATUS
OWNER
OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
INDICATED	318,300,000
UNITS	MT ORE
YEAR/DATA	1980

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P2O5	6.2	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: RESERVE TONNAGE IS TOTAL OF MAARDU, TOOLSE, AND KINGISEPP.

SOURCE FOR RECORD 1:
BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. LONDON, 1980.

PHOSPHORUS & POTASSIUM. NEWS ITEM REGARDING U.S.S.R. NO. 112 (MARCH/APRIL). BRITISH SULPHUR CORPORATION, 1981.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE

----------EXPLORATION METHODS----------
GEOPHYSICAL/CORE DRILLING

YEAR OF DISCOVERY: 1967
YEAR OF INITIAL PRODUCTION: 1963

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR

MINERALIZED ZONE:
AVERAGE DEPTH: 19 METERS
AVERAGE THICKNESS: 2.2 METERS

LITHOLOGY:
NAME OF FORMATION: BEDS OF TERMADOCIAN AGE GEOLOGIC AGE: LOWER ORDOVICIAN
ROCK TYPE:

PHOSPHORITE	IS ORE
SANDSTONE	NEAR ORE; ENCLOSES ORE
LIMESTONE	GANGUE; NEAR ORE
COQUINA	LIES UNDER ORE; NEAR ORE
DOLOMITE	LIES OVER ORE; NEAR ORE
SCHIST	NEAR ORE
SAND	LIES OVER ORE; NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
DOLOMITE	CARBONATES
GLAUCONITE	SILICATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: USSR
LATITUDE: N 58 45 00 LONGITUDE: E 27 30 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: USSR
LATITUDE: N 58 45 00 LONGITUDE: E 27 30 00

BENEFICIATION:
METHOD: FLOTATION ---------- DESCRIPTION OF MILLING -------
ORE/GRIND/MILL/FLOAT/SHIP CONCENTRATE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	79	28.5	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: USSR
LATITUDE: N 58 45 00 LONGITUDE: E 27 30 00
PERCENT SHIPPED: 100
DESTINATION FACILITY: MARKET LOCATION: USSR

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. LONDON, 1980.

THE MINERAL INDUSTRY OF THE U.S.S.R. MINERALS YEARBOCK. 1975.

OXFORD WORLD ATLAS. OXFORD UNIVERSITY PRESS, 1973.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-II. NO. 103 (9/10), 1979B, PP. 21-23, 43.

PHOSPHORUS & POTASSIUM. NEWS ITEM REGARDING U.S.S.R., NO. 112 (MARCH/APRIL), BRITISH SULPHUR CORPORATION, 1981.

SHABAD, T. BASIC INDUSTRIAL RESOURCES OF THE U.S.S.R. COLUMBIA UNIVERSITY PRESS, NEW YORK AND LONDON, 1979, 108 PP.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: KIROV MINE (KUKISVUMCHORSK) SEQUENCE NUMBER: 4610530033

NATION: USSR
SUBDIVISION: MORDAVIAN A.S.S.R.
TYPE OF OPERATION: SURFACE-UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 67 DEG 45 MIN 00 SEC
LONGITUDE: E 33 DEG 44 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 7514991 EASTING: 530988
POINT OF REFERENCE: ORE BODY
ELEVATION: 1100 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
KUKISVUMCHORSK
KHIBNY MASSIF
APATIT COMBINE

OWNERSHIP
GOVERNMENT OF U.S.S.R.
APATIT PRODUCTION ASSOC./
KOLA COMBINE (GOVT. BUREAU)

STATUS
OWNER
OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD: UNKNOWN
YEAR OF DISCOVERY: 1926
YEAR OF INITIAL PRODUCTION: 1926

-------EXPLORATION METHODS-------
CORE DRILLING/GEOPHYSICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: PHOSPHATE-BEARING LAYERS WITHIN A SYENITE PLUTON
SHAPE OF ORE BODY: TABULAR; MASSIVE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
AVERAGE DEPTH: 200 METERS
AVERAGE THICKNESS: 200 METERS

LITHOLOGY:
GEOLOGIC AGE: PALEOZOIC
DEFORMATION DESCRIPTION: INTRUSION
ROCK TYPE:

SYENITE	ENCLOSES ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 19000 UNITS: MT ORE/DAY
PERCENT WASTE ROCK: 35.8

UNDERGROUND MINING:
METHOD: SHRINKAGE METHODS
CAPACITY: 20,000 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 45 00 LONGITUDE: E 33 44 00
METHOD OF TRANSPORTATION: TRUCK DISTANCE (KM): 2
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 42 00 LONGITUDE: E 33 24 00

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 45 00 LONGITUDE: E 33 44 00
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 40 00 LONGITUDE: E 33 35 00

BENEFICIATION:
METHOD: FLOTATION -------DESCRIPTION OF MILLING-------
ORE/CRUSH/GRIND/FLOAT

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	82	39.5	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 42 00 LONGITUDE: E 33 24 00
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: FOB MILL

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 40 00 LONGITUDE: E 33 35 00
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: FOB MILL

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1980, LONDON.

DZHUMALIEV, T.D. PHOSPHORITE-BEARING DEPOSITS AT THE BASE OF THE SHABAKTY FORMATION OF THE MALYI KARATAU IN KAZAKHSTAN. LITOLOGIYA: POLEZMJE ISKAPAENIYE, 3, 1972, PP. 76-85. TRANSLATIONS AVAILABLE FROM CONSULTANTS BUREAU, PLENUM PRESS, NEW YORK.

ENGINEERING AND MINING JOURNAL. SOVIET UNION EXPANDING MINERALS INDUSTRY. JULY, 1973.

ENGINEERING AND MINING JOURNAL. SOVIET BUREAUCRATS SQUABBLE OVER USE OF PHOSPHATE ROCK. APRIL, 1980.

ENGINEERING AND MINING JOURNAL. RUSSIAN MINING SECTOR PROBLEMS NEGLECTED BY BUREAUCRATS. PRAVDA, DECEMBER, 1980B, P. 13.

ISMA. NEWS ITEM REGARDING PHOSPHATES AT OKTYNBINSK, U.S.S.R. 1981.

MINING ANNUAL REVIEW. EASTERN EUROPE PHOSPHATE. 1981, PP. 590-591.

MINING MAGAZINE. SUB-LEVEL CAVING IN SOVIET APATITE-NEPHELINE ORE. NOVEMBER, 1975, P. 405.

NOTHOLT, A. J. G. THE ECONOMIC GEOLOGY AND DEVELOPMENT OF IGNEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE U.S.S.R. ECONOMIC GEOLOGY, 74, 1979, PP. 339-350.

PHOSPHORUS & POTASSIUM. NEWS ITEM REGARDING U.S.S.R. NO. 94 (3/4), 1978.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-I. NO. 102 (7/8), 1979, PP. 16-17, 19-20.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-II. NO. 103 (9/10), 1979, PP. 21-23, 43.

STRISHKOV, E. M. MINERAL INDUSTRIES OF THE U.S.S.R. BUREAU OF MINES, U.S. DEPT. OF INTERIOR, PUBLICATION MP-2, 1977, 19 PP.

UNESCO. GENESIS OF PRE-CAMBRIAN IRON AND MANGANESE DEPOSITS. PROCEEDINGS OF THE KIEV SYMPOSIUM 20-25 AUG. 1970, 1973.

ZELLARS, M.E. AND J.M. WILLIAMS. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. FINAL REPORT. PREPARED FOR THE BUREAU OF MINES, U.S. DEPT. OF THE INTERIOR, CONTRACT NO. J0377000, ZELLARS-WILLIAMS, INC., LAKELAND, FLORIDA, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: YUKSPOR
SEQUENCE NUMBER: 4610530060

NATION: USSR
SUBDIVISION: MORDAVIAN U.S.S.R.
TYPE OF OPERATION: SURFACE-UNDERGROUND
CURRENT STATUS: PRODUCER
LATITUDE: N 67 DEG 45 MIN 00 SEC
LONGITUDE: E 33 DEG 44 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: NORTHERN
NORTHING: 7514991 EASTING: 530988
POINT OF REFERENCE: ORE BODY
ELEVATION: 1100 METERS
PRECISION: 100 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
YUKSPORSK
KHIBNY MASSIF
APATIT COMBINE

OWNERSHIP
GOVERNMENT OF U.S.S.R.
APATIT PRODUCTION ASSOC./
KOLA COMBINE (USSR-STATE OWNED)

STATUS
OWNER
OPERATOR

COMMODITY
PHOSPHATE

MARKETABILITY
PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

NO PUBLISHED RESERVES HAVE BEEN LOCATED FOR THIS DEPOSIT.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
YEAR OF DISCOVERY: 1926
YEAR OF INITIAL PRODUCTION: 1955

-------EXPLORATION METHODS-------
CORE DRILLING/GEOPHYSICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: PHOSPHATE-BEARING LAYERS WITHIN A SYENITE PLUTON
SHAPE OF ORE BODY: TABULAR; MASSIVE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
AVERAGE DEPTH: 200 METERS
AVERAGE THICKNESS: 200 METERS

LITHOLOGY:
DEFORMATION DESCRIPTION: INTRUSION
GEOLOGIC AGE: PALEOZOIC
ROCK TYPE:
SYENITE ENCLOSES ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 1200 UNITS: MT ORE/DAY

UNDERGROUND MINING:
METHOD: BLOCK CAVING
CAPACITY: 15,000 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 45 00 LONGITUDE: E 33 44 00
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 40 00 LONGITUDE: E 33 35 00

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 45 00 LONGITUDE: E 33 44 00
METHOD OF TRANSPORTATION: RAIL
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: KOLA PENINSULA (USSR)
LATITUDE: N 67 40 00 LONGITUDE: E 33 35 00

BENEFICIATION:
METHOD: FLOTATION -------DESCRIPTION OF MILLING-------
ORE/CRUSH/GRIND/FLOAT

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	81	39.5	WT-PCT

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. LONDON, 1980.

DZHUMALIEV, T. D. PHOSPHORITE-BEARING DEPOSITS AT THE BASE OF THE SHABAKTY FORMATION OF THE MALYI KARATAU IN KAZAKHSTAN. LITOLOGIYA: POLEZMJE ISKAPAENIYE, 3, 1972, PP. 76-85. TRANSLATIONS AVAILABLE FROM CONSULTANTS BUREAU, PLENUM PRESS, NEW YORK.

ENGINEERING AND MINING JOURNAL. SOVIET UNION EXPANDING MINERALS INDUSTRY. JULY, 1973.

ENGINEERING AND MINING JOURNAL. SOVIET BUREAUCRATS SQUABBLE OVER USE OF PHOSPHATE ROCK. APRIL, 1980.

ENGINEERING AND MINING JOURNAL. RUSSIAN MINING SECTOR PROBLEMS NEGLECTED BY BUREAUCRATS. PRAVDA, DECEMBER, 1980, P. 1,3.

ISMA. NEWS ITEM REGARDING PHOSPHATES AT OKTYNBINSK, U.S.S.R. 1981.

MINING ANNUAL REVIEW. EASTERN EUROPE PHOSPHATE. 1981, PP. 590-591.

MINING MAGAZINE. SUB-LEVEL CAVING IN SOVIET APATITE-NEPHELINE ORE. NOVEMBER, 1975, P. 405.

NOTHOLT, A. J. G. THE ECONOMIC GEOLOGY AND DEVELOPMENT OF IGNEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE U.S.S.R. ECONOMIC GEOLOGY, 74, 1979, PP. 339-350.

PHOSPHORUS & POTASSIUM. NEWS ITEM REGARDING U.S.S.R. NO. 94 (3/4), 1978.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-I. NO. 102 (7/8), 1979a, PP. 16-17, 19-20.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN TENTH FYP-II. NO. 103 (9/10), 1979b, PP. 21-23, 43.

STRISHKOV, E. M. MINERAL INDUSTRIES OF THE U.S.S.R. BUREAU OF MINES, U.S. DEPT. OF INTERIOR, PUBLICATION MF-2. 1977, 19 PP.

ZELLARS, M. E., AND J. M. WILLIAMS. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. FINAL REPORT. PREPARED FOR THE BUREAU OF MINES, U.S. DEPT. OF THE INTERIOR, CONTRACT NO. J0377000, ZELLARS-WILLIAMS, INC., LAKELAND, FLORIDA, 1978.

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: SELIGDAR
SEQUENCE NUMBER: 4610930006

NATION: USSR
SUBDIVISION: YAKUTSKAYA A.S.S.R.
TYPE OF OPERATION: UNKNOWN
CURRENT STATUS: EXPLORED DEPOSIT
LATITUDE: N 59 DEG 04 MIN 00 SEC
LONGITUDE: E 125 DEG 24 MIN 00 SEC
UTM - ZONE: 51 HEMISPHERE: NORTHERN
NORTHING: 6549739 EASTING: 637605
POINT OF REFERENCE: ORE BODY
PRECISION: 5 KILOMETERS
YEAR OF INFORMATION: 1981

OWNERSHIP	STATUS
GOVERNMENT OF U.S.S.R.	OWNER

COMMODITY	MODIFIER	MARKETABILITY
PHOSPHATE		PRIMARY PRODUCT
IRON	HEMATITE	RECOVERABLE

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
UNDIFFERENTIATED	100,000,000
UNITS	MT ORE
YEAR/DATA	1980

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
MINING JOURNAL. VOL 293, NO. 7510, JULY 17, 1979, P. 70.

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

MODE OF ORIGIN: HYDROTHERMAL; CONTACT METASOMATIC
CONTROLLING FEATURES: FAULTING

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
BIOTITE	SILICATES
HORNBLENDE	SILICATES
HEMATITE	OXIDES

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR CORPORATION. WORLD SURVEY OF PHOSPHATE DEPOSITS. LONDON, 1980.

CONGER, D. SIBERIA: RUSSIA'S FROZEN FRONTIER. NATIONAL GEOGRAPHIC, 131 (3), 1967, PP. 297-347.

ISMA-SINGAPORE. NEWS ITEM ON OSHURKOV MINE. 1981.

NOTHOLT, A. J. G. THE ECONOMIC GEOLOGY AND DEVELOPMENT OF IGNEOUS PHOSPHATE DEPOSITS IN EUROPE AND THE U.S.S.R. ECONOMIC GEOLOGY, 74 (2), 1979, PP. 339-350.

PARFENOV, V. C., AND N. I. YUDIN. APATITE POTENTIAL OF THE PRE CAMBRIAN OF THE CENTRAL ALDAN. DOKLADY, EARTH SCIENCES SECTION, 229: 129-131. AMER. GEOL. INST., SCRIPTA PUBLISHING CO.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN THE 10TH FYP-I. NO. 102, JULY/AUGUST, 1979, PP. 16-17, 19-20.

PHOSPHORUS & POTASSIUM. SOVIET PHOSPHATES IN THE 10TH FYP-II. NO. 103, SEPT./OCT., 1979, PP. 21-23, 43.

STEWART, J. M. SIBERIA, OPTIMA, 26 (2), 1976, PP. 85-104.

U.S.S.R. C-11. GEOLOGICAL CHARACTERISTICS OF COMMERCIAL DEPOSITS OF MAIN KINDS OF MINERAL RAW MATERIALS FOR FERTILIZERS IN THE U.S.S.R., IN: PROCEEDINGS OF THE SEMINAR ON SOURCES OF RAW MATERIALS FOR THE FERTILIZER INDUSTRY IN ASIA AND THE FAR EAST. ECAFE MINERAL RESOURCES DEVELOPMENT SERIES, NO. 30, PART 2, DOCUMENTATION, 1968, PP. 100-104.

ZELLARS, M. E., AND J. M. WILLIAMS. EVALUATION OF THE PHOSPHATE DEPOSITS OF FLORIDA USING THE MINERALS AVAILABILITY SYSTEM. PREPARED FOR U.S. DEPT. OF INTERIOR, BUREAU OF MINES, CONTRACT NO. J0377000, 1978.

VENEZUELA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: RIECITO
SEQUENCE NUMBER: 3070210001

NATION: VENEZUELA
SUBDIVISION: FALCON
TYPE OF OPERATION: SURFACE
CURRENT STATUS: TEMPORARY SHUTDOWN
LATITUDE: N 10 DEG 55 MIN 00 SEC
LONGITUDE: E 68 DEG 45 MIN 00 SEC
UTM - ZONE: 42 HEMISPHERE: NORTHERN
NORTHING: 1206701 EASTING: 472680
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 608 METERS
PRECISION: 10 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

ALTERNATE NAMES
MORON

OWNERSHIP	STATUS
PETROQUIMICA DE VENEZUELA (VENEZUELAN GOVT.)	OWNER-OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	20,000,000
UNITS	MT ORE
YEAR/DATA	1980

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	27	WT-PCT

RESERVE-RESOURCE - REMARKS

RECORD 1: GRADE RANGES FROM 27 TO 30 PERCENT P205.

SOURCE FOR RECORD 1:
BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1973 AND 1980 EDITIONS.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
GEOLOGICAL INFERENCE

YEAR OF DISCOVERY: 1931
YEAR OF INITIAL PRODUCTION: 1956
YEAR OF FINAL PRODUCTION: 1979

----------EXPLORATION METHODS----------
CORE DRILLING/TEST PIT/SURFACE GEOLOGICAL MAPPING/AUGER/ RECONNAISSANCE SOIL SAMPLING/ GEOCHEMICAL

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: BRECCIA FILL
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: MASSIVE
CONTROLLING FEATURES: FAULTING

MINERALIZED ZONE:
AVERAGE DEPTH: 21 METERS
MINIMUM DEPTH: 0 METERS
STRIKE/DIP: S45E/10W
AVERAGE THICKNESS: 14 METERS

LITHOLOGY:
NAME OF FORMATION: POZON FORMATION
GEOLOGIC AGE: MIOCENE
DEFORMATION DESCRIPTION: MAJOR FAULTING; FAULTING
RELATIONSHIP TO MINERALIZATION: MINERALIZATION PRECEDING DEFORMATION
ROCK TYPE:

LIMESTONE	LIES OVER ORE; GANGUE
BRECCIA	ENCLOSES ORE; IS ORE
SAND	GANGUE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
COLLOPHANE	PHOSPHATES
QUARTZ	SILICATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 2200
UNITS: MT ORE/DAY
DESCRIPTION OF COVER:
SAND, GRAVEL;
HARD ROCKS
HARDNESS OF ORE:
HARD ROCKS
AVERAGE COVER THICKNESS: 21 METERS

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE
LOCATION: RIECITO, VENEZUELA
LATITUDE: N 10 55 00
LONGITUDE: E 68 45 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK
DISTANCE (KM): 108
DESTINATION FACILITY: MILL (OFF-SITE)
LOCATION: MORON, VENEZUELA

BENEFICIATION:
METHOD: FLOTATION
DESIGN CAPACITY: 2273
UNITS: MT ORE/DAY
---------- DESCRIPTION OF MILLING ----------
ORE/CRUSH/WASH/SIZE/FLOAT/DRY

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	76	32.5	WT-PCT

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MILL (OFF-SITE)
LOCATION: MORON, VENEZUELA
DESTINATION FACILITY: FERTILIZER PLANT
LOCATION: MORON, VENEZUELA

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 1973 AND 1980 EDITIONS.

DORR-OLIVER. I.V.P. RIECITO MINE, EVALUATION OF RESERVES. PROJECT NO. 20312, JUNE 9, 1969.

MINERALS, APRIL 1977, P. 41.

PHOSPHORUS/POTASSIUM, NO. 91, SEPT. 10, 1977.

PONTE, C. ET AL. THE RIECITO PHOSPHATE DEPOSIT (SPAN). M.M.H., DIR. GEOL., 3RD VENEZUELIAN GEOL. CONF., PUB. ESP. NO. 3, VOL. 4, 1961, PP. 1641-1660.

SANTELIZ, H. EVALUATION OF THE PHOSPHATE ROCKS AT RIECITO (SPAN.). M.H.H., DIR.GEOL., C.G.V., 4TH, PUB. ESP. 5, VOL. 5, PP. 2773.

WESTERN SAHARA

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: BOU CRAA
SEQUENCE NUMBER: 7150000001

NATION: WESTERN SAHARA
SUBDIVISION: NOT SUBDIVIDED
TYPE OF OPERATION: SURFACE
CURRENT STATUS: TEMPORARY SHUTDOWN
LATITUDE: N 26 DEG 21 MIN 00 SEC
LONGITUDE: W 12 DEG 51 MIN 00 SEC
UTM - ZONE: 28 HEMISPHERE: NORTHERN
NORTHING: 2916068 EASTING: 714560
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
YEAR OF INFORMATION: 1981

TYPE OF MINERAL HOLDING
GOVERNMENT CONTROLLED

ALTERNATE NAMES
BU CRAA
WESTERN SAHARA
SPANISH SAHARA

OWNERSHIP	STATUS
OFFICE CHERIFIEN DES PHOSPHATES	OWNER
INSTITUTE NACIONAL DE INDUSTRIA	OWNER

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
MEASURED	1,700,000,000
UNITS	MT ORE
YEAR/DATA	1980

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
ENGINEERING AND MINING JOURNAL. MOROCCO. V. 183, NO. 9, SEPTEMBER 1982, P. 236.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
YEAR OF DISCOVERY: 1947
YEAR OF INITIAL PRODUCTION: 1962
YEAR OF FINAL PRODUCTION: 1977

-------EXPLORATION METHODS -------
DRILLING/SAMPLING

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

TYPE OF ORE BODY: SEDIMENTARY
MODE OF ORIGIN: SEDIMENTATION
SHAPE OF ORE BODY: TABULAR
CONTROLLING FEATURES: BEDDING

MINERALIZED ZONE:
AVERAGE DEPTH: 18 METERS MINIMUM DEPTH: 0 METERS
STRIKE/DIP: N23E/01W AVERAGE THICKNESS: 5.5 METERS

LITHOLOGY:
NAME OF FORMATION: MAESTRICHTIAN-PALEOCENE GEOLOGIC AGE: UPPER CRETACEOUS
ROCK TYPE:

CHERT	LIES OVER ORE
LIMESTONE	IS ORE
LIMESTONE	LIES ALONG ORE; LIES UNDER ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
FLUORAPATITE	PHOSPHATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: STRIPPING
CAPACITY: 18182 UNITS: MT ORE/DAY
DESCRIPTION OF COVER:
SAND, SILT;
HARD ROCKS
AVERAGE COVER THICKNESS: 18 METERS PERCENT WASTE ROCK: 76.6

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: BU CRAA PIT
LATITUDE: N 26 21 00 LONGITUDE: W 12 51 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: CONVEYOR DISTANCE (KM): 100
DESTINATION FACILITY: MILL (OFF-SITE) LOCATION: EL AAIUN PLANT

BENEFICIATION:
METHOD: WASHING -------- DESCRIPTION OF MILLING -------
DESIGN CAPACITY: 18182 ORE/CRUSH/WASH/CRUSH/
UNITS: MT ORE/DAY DESLIME BY CYCLONES/WASH/FILTER DRY/
THERMAL DRY/STOCKPILE

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P205	67	36.6	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (OFF-SITE) LOCATION: EL AAIUN PLANT
PERCENT SHIPPED: 100
DESTINATION FACILITY: PORT LOCATION: EL AAIUN

BIBLIOGRAPHY RECORDS

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS, 3RD, 1973.

CALVO, JOAQUIN. SAHARA'S PHOSPHATE ROCK AND DISCUSSION OF THE SYSTEMS AND METHODS TO MINE BOU CRAA'S DEPOSIT. SIXTH WORLD MINING CONGR. FED REP. GERMANY, MAY 1976. P. 11.

ENGINEERING & MINING JOURNAL. FEB. 1976.

ENGINEERING & MINING JOURNAL. MARCH 1974, P. 34.

ENGINEERING & MINING JOURNAL. APRIL 1976, P. 27.

ENGINEERING & MINING JOURNAL. AUGUST 1975, P. 44.

ENGINEERING & MINING JOURNAL. JAN. 1976, P. 147.

GREMILLION L. R. CHARACTERIZATION OF PHOSPHATE ROCK FROM SPANISH SAHARA. TVA, SEPT. 24, 1971.

IBRI. REPORT ON MOROCCO. 1978.

IBRD. REPORT ON WESTERN SAHARA. 1978.

INDUSTRIAL MINERALS. WESTERN SAHARA. APRIL 1976.

MINING MAGAZINE. MAY 1976.

MINERALS YEARBOOK. SAHARA. 1978-9.

PHOSPHATE AND POTASSIUM. SPANISH SAHARA PHOSPHATE, (N.D.).

PHOSPHATE AND POTASSIUM. EL AAIUN PORT, SHIPPING POINT FOR SPANISH SAHARA PHOSPHATE, (N.D.).

PHOSPHATE AND POTASSIUM. PHOSPHATE TRANSPORTATION BY CONVEYOR IN THE SPANISH SAHARA.

WESTERN SAHARA MINING ANNUAL RIVIEW 1980, P. 540.

WORLD MINING. FEB. 1976, P. 33.

WORLD MINING. MARCH 1976, P. 78.

WORLD MINING. NOV. 1976, P. 79.

WORLD MINING. SEPT. 1973, P. 55.

WORLD MINING. NOV. 1975, P. 68.

WORLD MINING. MOROCCO, OCT. 1980.

ZIMBABWE

LOCATION AND GENERAL DEPOSIT INFORMATION

DEPOSIT NAME: DOROWA
SEQUENCE NUMBER: 7960250042

NATION: ZIMBABWE
SUBDIVISION: INYAZURA
TYPE OF OPERATION: SURFACE
CURRENT STATUS: PRODUCER
LATITUDE: S 19 DEG 02 MIN 00 SEC
LONGITUDE: E 31 DEG 45 MIN 00 SEC
UTM - ZONE: 36 HEMISPHERE: SOUTHERN
NORTHING: 7895142 EASTING: 368453
POINT OF REFERENCE: ORE BODY
PRECISION: 1 KILOMETER
ELEVATION: 1250 METERS
PRECISION: 500 METERS
DATUM: SEA LEVEL
YEAR OF INFORMATION: 1981

OWNERSHIP	STATUS
AFRICAN EXPLOSIVES AND CHEMICAL INDUSTRIES LTD.	OWNER
DOROWA MINERALS LTD.	OPERATOR

COMMODITY	MARKETABILITY
PHOSPHATE	PRIMARY PRODUCT

PUBLISHED RESERVE-RESOURCE INFORMATION

	RECORD 1
UNDIFFERENTIATED	37,100,000
UNITS	MT ORE
YEAR/DATA	1980

IN SITU GRADE:

RECORD	ASSAY FORM	GRADE	UNIT
1	P205	7.9	WT-PCT

RESERVE-RESOURCE - REMARKS

SOURCE FOR RECORD 1:
BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, LONDON, 1980.

DEPOSIT HISTORICAL INFORMATION

DISCOVERY METHOD:
ORE-MINERAL IN PLACE
-------EXPLORATION METHODS-------
DRILLING
YEAR OF DISCOVERY: 1938
YEAR OF INITIAL PRODUCTION: 1965

GEOLOGIC AND SPATIAL CHARACTERISTICS OF DEPOSIT

MODE OF ORIGIN: HYDROTHERMAL; MAGMATIC DIFFERENTIATION
SHAPE OF ORE BODY: MASSIVE
CONTROLLING FEATURES: IGNEOUS

MINERALIZED ZONE:
AVERAGE DEPTH: 0 METERS
MINIMUM DEPTH: 0 METERS
AVERAGE LENGTH: 2438 METERS
AVERAGE WIDTH: 2350 METERS
AVERAGE THICKNESS: 200 METERS

UNCONSOLIDATED MATERIAL:
AVERAGE THICKNESS: 0 METERS

LITHOLOGY:
NAME OF FORMATION: DOROWA COMPLEX GEOLOGIC AGE: TRIASSIC
DEFORMATION DESCRIPTION: INTRUSION
GEOLOGIC AGE: TRIASSIC
ROCK TYPE:
CARBONATITE IS ORE; NEAR ORE
SYENITE IS ORE; NEAR ORE
GRANITE NEAR ORE

MINERALIZATION:

MINERAL NAME	MINERAL CLASS
APATITE	PHOSPHATES
MAGNETITE	OXIDES (EXCLUDING SIO2)
QUARTZ	FORMS OF SIO2
KAOLINITE	SILICATES

MINE/MILL INFORMATION

SURFACE MINING:
METHOD: OPEN-PIT
CAPACITY: 2900 UNITS: MT ORE/DAY

TRANSPORTATION (ORE):
ORIGINATING FACILITY: MINE LOCATION: ZIMBABWE
LATITUDE: S 19 02 00 LONGITUDE: E 31 45 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: SCRAPER
DESTINATION FACILITY: MILL (ON-SITE) LOCATION: ZIMBABWE
LATITUDE: S 19 02 00 LONGITUDE: E 31 45 00

BENEFICIATION:
METHOD: FLOTATION
DESIGN CAPACITY: 2900
UNITS: MT ORE/DAY
--------- DESCRIPTION OF MILLING -------
ORE/TUMBLING/SIZING/MAGNETIC SEPARATION/ MILLING/DESLIMING/CONDITIONING/ FLOTATION/DRYING

PRODUCT	ASSAY FORM	RECOVERY	CONCENTRATE GRADE	UNIT
PHOSPHATE ROCK	P2O5	59	35	WT-PCT

TRANSPORTATION FOR PRODUCT: PHOSPHATE ROCK
ORIGINATING FACILITY: MILL (ON-SITE) LOCATION: ZIMBABWE
LATITUDE: S 19 02 00 LONGITUDE: E 31 45 00
PERCENT SHIPPED: 100
METHOD OF TRANSPORTATION: TRUCK; RAIL DISTANCE (KM): 40; 190
DESTINATION FACILITY: FERTILIZER PLANT LOCATION: ZIMBABWE

BIBLIOGRAPHY RECORDS

AFRICAN EXPLOSIVES AND CHEMICAL INDUSTRIES, LTD. THE DOROWA STORY. A SUPPLEMENT TO MODERN FARMING, JULY 1965.

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 3RD EDITION, LONDON, 1971.

BRITISH SULPHUR. WORLD SURVEY OF PHOSPHATE DEPOSITS. 4TH EDITION, LONDON, 1980.

CHAMBER OF MINES JOURNAL. $3,000,000 EXTENSIONS AT DOROWA. AUGUST 1974, P. 28-29.

DE VOTO, R. H. AND D. N. STEVENS (EDITORS). URANIFEROUS PHOSPHATE RESOURCES AND TECHNOLOGY AND ECONOMICS OF URANIUM RECOVERY FROM PHOSPHATE RESOURCES, UNITED STATES AND FREE WORLD. VOL. 1, JUNE 1979, P. 413, 414.

WORLD BANK. WORLD TABLES. 2ND EDITION, 1980, P. 166-167.

APPENDIX A.--ALPHABETICAL LISTING OF ABSTRACTS BY DEPOSIT NAME

Deposit name	Country or State	Page
Abu Tartur	Egypt	501
Acrefoot Johnson	Florida	51
Akashat	Iraq	515
Al Borouj	Morocco	552
Anitapolis	Brazil	466
Arad	Israel	518
Araxa-Arafertil	Brazil	446
Araxa-Camig	Brazil	456
B. H. Griffin	Florida	53
Bayovar	Peru	578
Beckwith Hills	Wyoming	392
Ben Guerir	Morocco	559
Big Four	Florida	92
Blackfoot Bridge Site	Idaho	287
Bonny Lake Mine	Florida	166
Bou Craa	Western Sahara	663
Boyette II	Florida	90
Brooker-Dukes	Florida	13
C F Hardee Phosphate Complex	Florida	55
Caldwell Canyon Site	Idaho	270
Cargill	Canada	468
Catalao (Goiasfertil)	Brazil	440
Catalao-Fosfago	Brazil	443
Centennial Phosphate Mine	Idaho	291
Central Wasatch Range	Utah	347
Champ Lease	Idaho	241
Charleston Region Deposits	South Carolina	309
Chiliksay	U.S.S.R.	641
Christina Reserve	Florida	208
Christmas Island No. 1	Australia	419
Christmas Island No. 2	Australia	422
Clear Springs	Florida	178
Columbia County #1 Deposit	Florida	27
Conda Mine	Idaho	228
Cooks Hammock #1	Florida	116
Cooks Hammock #2	Florida	118
Coosawhatchee Region Deposits	South Carolina	307
Crawford Mountains	Utah	337
D Tree	Australia	432
D. E. Carlton	Florida	78
Dagbati	Togo	600
Daoui Nord	Morocco	554
Daoui-Recette 4	Morocco	545
David C. Turner Heirs	Florida	130
Deep Creek	Florida	19
Deseret Ranch	Florida	15
Desoto-Manatee Reserve	Florida	31
Diamond Creek Mine Site (Alumet)	Idaho	275
Djebel Onk	Algeria	414
Dorowa	Zimbabwe	666
Dry Valley Mine Site (FMC)	Idaho	279

Deposit name	Country or State	Page
Duchess	Australia	427
Duette Mine	Florida	126
Durrance/Waters Tract	Florida	62
East Pierce Deposit	Florida	114
Ein Yahav	Israel	526
El Hasa/El Abiad	Jordan	528
Emei	China	481
Esh-Shidiyah	Jordan	534
Fanshan	China	470
Farmland Hardee Mine	Florida	49
Farmland Hillsborough Reserve	Florida	102
Farmland/Ona Area-Small Ownership	Florida	80
First Mississippi Chemical Tract	Florida	100
Flaming Gorge	Utah	327
Florida Agglite Debris Plant	Florida	98
Fort Green Mine	Florida	155
Fort Meade Mine (Gardinier)	Florida	200
Fort Meade Mine (Mobil)	Florida	186
Four Corners	Florida	124
Freeport Area Small Ownerships	Florida	76
Fridovich	Florida	206
Fuzhuan	China	477
Gaiyang	China	475
Gay Mine	Idaho	224
Gros Ventre Range	Wyoming	404
Gunming	China	489
Gunyang	China	486
Hahatoe/Kpogame	Togo	602
Hamilton County Reconnaissance	Florida	45
Hamrawein	Egypt	494
Hard Rock Deposit	Florida	150
Hardee Mine	Florida	58
Hardee West Prospect	Florida	64
Hardrock Deposit	Florida	17
Haynsworth Mine	Florida	163
Hazara	Pakistan	576
Henry Mine	Idaho	245
Hillsborough Co.-Farmland/Brewster	Florida	104
Hoback Range	Wyoming	409
Hooker Chemical Properties	Tennessee	311
Hookers Prairie Mine	Florida	169
Hopewell Mine	Florida	110
Horse Creek	Florida	60
Horse Creek, D.E. Carlton	Florida	35
Hunt Brothers Ranch	Florida	106
Husky No. 1 Lease	Idaho	283
Ipanema I & II	Brazil	461
Itataia	Brazil	438
Jacupiranga	Brazil	463
Jhamarkotra	India	512
Jin-Ho	China	483
Jingbing	China	485
Jingshan	China	473

Deposit name	Country or State	Page
Kalaa Khasba	Tunisia	605
Kara Tau Deposits	U.S.S.R.	638
Kef Eschfair	Tunisia	609
Keys Property	Florida	128
Khouribga Underground	Morocco	547
Kingisepp	U.S.S.R.	649
Kingsford Mine	Florida	175
Kirov Mine (Kukisvumchorsk)	U.S.S.R.	652
Kneifess	Syria	597
Koashva	U.S.S.R.	625
Kovdor	U.S.S.R.	644
La Crosse Deposit	Florida	9
Lacunga River	Angola	417
Lady Annie/Lady Jane	Australia	430
Lake County Deposit	Florida	120
Lakes Deposit	Florida	7
Lee Creek Mine	North Carolina	302
Limestone Land Company	Florida	66
Lithia-Boyette	Florida	112
Little Payne Creek	Florida	195
Live Oak Deposit	Florida	216
Lonesome Mine	Florida	95
M'Dilla	Tunisia	612
M. C. West Properties	Tennessee	321
Manatee North	Florida	136
Manatee South	Florida	140
Manson-Jenkins	Florida	68
Maybe Canyon Mine	Idaho	237
Mazidag	Turkey	622
Mcalpin Deposit	Florida	218
Meraa El Arech	Morocco	543
Meskala District	Morocco	562
Metlaoui	Tunisia	607
Mobil Area	Florida	84
Mobil Chemical Company	Tennessee	316
Molodezhnyy (Rasvumchorr)	U.S.S.R.	633
Monsanto Properties	Tennessee	324
Moscow Region	U.S.S.R.	631
Moulares/M'Rata	Tunisia	616
Mountain Fuel Lease	Idaho	233
Nahal Zin	Israel	523
Nauru Island	Nauru	573
Nichols Mine	Florida	181
Noralyn/Phosphoria Mine	Florida	172
North Baker County Deposit	Florida	11
North Carolina Phosphate Corp.	North Carolina	298
North Columbia County #2	Florida	23
North Columbia Deposit	Florida	29
North Henry Mine	Idaho	266
North Lake City Deposit	Florida	21
Northeast Manatee Swift/Grace	Florida	144
Northeast Manatee-Altman Tract	Florida	134
Northeast Manatee/Texaco	Florida	148

Deposit name	Country or State	Page
Northern Deposits	Australia	434
Northern Wasatch Range	Utah	342
Olinda-Paulista/Igarassu	Brazil	459
Olliff Option	Florida	74
Oron	Israel	521
Osceola National Forest	Florida	25
Oshurkov	U.S.S.R.	636
Palabora	South Africa	590
Pallo (Thies)	Senegal	584
Pamlico River Deposit	North Carolina	305
Patos De Minas	Brazil	452
Payne Creek-Palmetto	Florida	152
Pesca	Colombia	491
Pierce-Pebbledale	Florida	161
Pine Level Deposit	Florida	33
Pirkle Deposit 1	Florida	5
Polk County Mine	Florida	203
Pungo River Deposit	North Carolina	300
Qena	Egypt	505
Quseir	Egypt	497
Rasmussen Ridge Mine Site (Stauffer)	Idaho	253
Redeyef	Tunisia	614
Relyea Mine	Montana	293
Riecito	Venezuela	660
Rockland Mine	Florida	197
Ruseifa	Jordan	531
Rutland-Colvin-Vale	Florida	132
Saddle Creek-Ebersbach	Florida	158
Safaga	Egypt	499
Salt River Range	Wyoming	379
San Hilario	Mexico	538
San Juan De La Costa	Mexico	540
Santa Domingo	Mexico	536
Sarasota County Deposit No. 1	Florida	212
Sarasota County Deposit No. 2	Florida	214
Savannah Deposit	Georgia	220
Sebaiya West	Egypt	503
Sehib	Tunisia	619
Seligdar	U.S.S.R.	658
Shandong	China	479
Sharp Property	Florida	88
Sharkya (A&B)	Syria	593
Sherrin Creek/Lily Creek	Australia	436
Sidi Hajjaj	Morocco	550
Siilinjarvi	Finland	507
Silver City Mine	Florida	192
Smoky Canyon Lease	Idaho	257
Snake River Range	Wyoming	373
Sokli	Finland	510
South Fort Meade Mine	Florida	184
South Hardee	Florida	86
South Ridges	Wyoming	395
Southeast Wind River Range	Wyoming	367

Deposit name	Country or State	Page
Southern Khouribga Region	Morocco	557
Southern Wasatch Range	Utah	362
St. John's County Deposit	Florida	210
Stanaland Ranch	Florida	108
Statenville Deposit	Georgia	222
Stauffer Chemical Co. Properties	Tennessee	318
Sublette Range	Wyoming	399
Suwannee River Mine	Florida	39
Swift Creek Mine	Florida	42
Swift/Durrance Area	Florida	146
Taiba	Senegal	587
Tapira (Valep)	Brazil	449
Tarag El Hbari	Syria	595
Tennessee Valley Authority Reserves	Tennessee	314
Texaco Manatee	Florida	138
Trail Creek Lease	Idaho	262
Tsentralanyy	U.S.S.R.	628
Tunp Range	Wyoming	388
Turayf	Saudi Arabia	582
Turner Property	Florida	142
Vernal Field	Utah	356
Vernal Mine	Utah	352
Viatka-Kama	U.S.S.R.	647
W. Bethel and Adjacent Deposits	Florida	37
Warm Springs Creek Phosphate Mine	Montana	295
Waters Tract	Florida	70
Watson Mine	Florida	189
West Thaniyat	Saudi Arabia	580
Western Uinta Range	Utah	332
White Springs Deposit	Florida	47
Wingate Creek	Florida	122
Wonarah	Australia	425
Wooley Valley Mine	Idaho	249
Wyoming Range	Wyoming	384
Youssoufia Black Rock	Morocco	567
Youssoufia Open Cast	Morocco	570
Youssoufia White Rock	Morocco	564
Yukspor	U.S.S.R.	655
Zhongkiang	China	471
Zolfo/Stauffer	Florida	82
Zolfo Springs Area Small Ownerships	Florida	72

APPENDIX B.--LISTING OF ABSTRACT DATA SETS, SUBSETS, AND DATA ELEMENTS[1]

1. Location and general deposit information

- General information and location
  - Deposit name
  - Sequence number
  - State or nation
  - County or political subdivision
  - Type of operation
    - Surface
    - Underground
    - Surface-underground
    - Prospect
    - Mineral location
    - Unknown
  - Current status
    - Producer
    - Past producer
    - Temporary shutdown
    - Developing deposit [on-line]
    - Explored deposit [quantified reserves]
    - Raw prospect [little or no exploration]
  - Latitude
  - Longitude
  - Universal Transverse Mercator--UTM
    - Zone
    - Hemisphere
    - Northing
    - Easting
  - Point of reference
    - Main entry
    - Trench
    - Ore body
    - Claim
    - Plant
    - Town
  - Precision
  - Elevation
  - Precision
  - Datum
  - Year of information
  - Type of mineral holding
    - Located claim
    - Patented claim
    - Federal lease
    - State lease
    - Private lease
    - Fee ownership
    - Minerals only
    - Other--free-form entry
  - Alternate names
  - Ownership
  - Status
  - Commodity
  - Modifier
  - Marketability
    - Primary product
    - Coproduct
    - Byproduct
    - Recoverable [potential plant byproduct]
    - Affect marketability [fertilizer manufacturing contaminant]

2. Published reserve and resource information

- Published information
  - Measured
  - Indicated
  - Demonstrated [cumulated tonnage of measured and indicated reserves]
  - Inferred
  - Undifferentiated [not categorized]
  - Units
    - mt ore
  - Year of data
  - Record
  - In situ grade
  - Assay form
  - Grade
  - Unit
    - wt-pct
  - Reserve and resource remarks
  - Source for records

[1]Information in brackets defines usages particular to this directory.

3. Deposit historical information

- General information
  - Discovery method
    - Ore mineral in place
    - Ore mineral not in place
    - Auxiliary mineral in place
    - Auxiliary mineral not in place
    - Geophysical anomaly
    - Geological inference
  - Exploration methods
  - Year of discovery
  - Year of initial production
  - Year of final production

4. Geologic and spatial characteristics of deposit

- General information
  - Type of ore body
    - Disseminated
    - Placer
    - Sedimentary
    - Other--free-form entry
  - Mode of origin
    - Hydrothermal
    - Contact metasomatic
    - Magmatic differentiation
    - Sedimentation
    - Residual concentration
    - Replacement
    - Other--free-form entry
  - Shape of ore body
    - Tabular
    - Lenticular
    - Massive
    - Irregular
  - Controlling features
    - Folding
    - Faulting
    - Igneous
    - Bedding
    - Lithology
    - Other--free-form entry
  - Degree of wallrock alteration
    - None
    - Slight
    - Moderate
    - Intense
- Mineralized zone
  - Average depth
  - Minimum depth
  - Average length
  - Average width
  - Average thickness
  - Strike and/or dip
- Unconsolidated material
  - Average thickness
  - Minimum thickness
- Lithology
  - Name of formation
  - Geologic age
  - Deformation description
    - Minor folding
    - Faulting
    - Major faulting
    - Metamorphism
    - Intrusion
    - Other--free-form entry
    - None
- Relationship to mineralization
  - Mineralization preceding deformation
  - Mineralization during deformation
  - Mineralization preceding and during deformation
  - Mineralization following deformation
  - Mineralization during and following deformation
  - Mineralization preceding, during, and following deformation
  - Complex
- Geologic age
- Rock type (name of rock)
  - Ore in fractures
  - Lies along ore
  - Lies over ore
  - Lies under ore
  - Replaced by ore
  - Encloses ore
  - Gangue
  - Is ore

Mineralization
  Mineral name
  Mineral class
    Silicates
    Sulfides
    Sulfosalts
    Oxides, excluding SiO_2
    Carbonates
    Sulfates and chromates
    Phosphates

Grain size
  Aphanitic
  Phaneritic--fine
  Phaneritic--medium
  Phaneritic--coarse
  Pegmatitic
  Variable

5. Mine and mill information

Surface mining
  Method
    Open pit
    Strip--hillside
    Stripping
    Bench (berm)
    Quarry
    Glory hole
    Alluvial mining
    Hydraulicking
    Dredging
    Nonfloating plant
  Capacity
  Units
    mt ore/day
  Description of cover
    Sand, silt
    Quicksand [wet unconsolidated sediments]
    Sand, gravel
    Hardpan
    Medium-hard rocks
    Hard rocks
  Hardness of ore
    Sand, silt
    Quicksand [wet unconsolidated sediments]
    Sand, gravel
    Hardpan
    Medium-hard rocks
    Hard rocks
  Average cover thickness
  Surface area
  Percent waste rock
  Slope of pit [highwall angle]
  Bench height

Underground mining
  Method
    Open stope
    Gophering [coyoting]
    Breast stoping
    Room and pillar
    Underhand
    Glory hole
    Overhand
    Pillar and chamber
    Sublevel
    Other open-stope methods
    Timbered stopes
    Overhand square-set
    Underhand square-set
    Horizontal square-set
    Other timbered stopes
    Filled stopes
    Timber with subsequent fill
    Horizontal cut and fill with waste rock
    Horizontal cut and fill with tailings
    Resuing
    Ascending crosscuts
    Descending crosscuts
    Inclined cut and fill
    Other filled-stope methods
    Caving methods
    Top slicing
    Inclined top slicing
    Sublevel caving
    Longwall caving
    Other caving methods
    Shrinkage methods
    Other shrinkage methods

Method--Continued
  Combined methods
  Shrinkage with caving
  Shrinkage with timbered methods
  Shrinkage with cut and fill
  Timbered stopes with caving methods
  Caving methods with timbered methods
  Auger mining
  Solution mining
  Frasch process
Capacity
Units
  mt ore/day
Rock and water conditions
  Hardrock with little water
  Hardrock fissured with moderate water
  Hardrock fissured with excessive water
  Soft nonplastic with little water
  Soft nonplastic fissured with moderate water
  Soft nonplastic fissured with excessive water
  Soft semiplastic with little water
  Noncoherent with little water
  Noncoherent with excessive water
Characteristic of rock
  No planes of weakness
  One system of weakness planes
  Multiple systems of weakness planes
  Noncoherent
  Semiplastic or plastic
Rock and mine support
  Supporting
  Supporting when dry
  Supporting--may back slab
  Unsupporting--no flow
  Unsupporting--no slough
  Unsupporting--may slough
  Completely incompetent
  Other--free-form entry
  Timber
  Chemical coating
  Post, headboard, caps. roof bolts
  Timber with lagging concrete--unreinforced
  Open steel sets
  Steel with lagging concrete--reinforced
  Can't support; fill or cave
Conditions of workings
  Caved at portal
  Flooded
  Bad air
  Open
  Plugged
  Sealed
  No mine entry
  Partly accessible
Total length of workings
Shafts--number
Average depth
Inclines--number
Average length of inclines
Slopes of inclines
Adits--number
Average length
Transportation (ore)
  Originating facility
    Mine
  Location
  Latitude
  Longitude
  Percent shipped
  Method of transportation
    Truck
    Rail
    Pipeline
    Conveyor
    Ocean
    Lake
    Air
    River
    Other--free-form entry
  Distance
  Destination facility
    F.o.b. mine
    Port
    Mill (onsite)
    Mill (offsite)
    Refinery
    Market
  Location
  Latitude
  Longitude
Beneficiation
  Method
    Handsort
    Sizing
    Washing
    Gravity
    Jig

67

Method--Continued
Classifier
Heavy media
Flotation
Hydrometallurgy unspecified
Magnetic
Electrostatic
Magnetic and electrostatic
Pyrometallurgy
Design capacity
Units
mt ore/day
Description of milling
Transportation for product
Originating facility
Mill (onsite)
Mill (offsite)
Location
Latitude
Longitude
Percent shipped
Method of transportation
Truck
Rail
Conveyor
Pipeline
Ocean
Lake
River
Other--free-form entry
Distance
Destination facility
F.o.b. mill
Port
Market
Refinery
Other
Location
Latitude
Longitude

6. Bibliographic records

☆U.S. GOVERNMENT PRINTING OFFICE: 1983-605-015/24

INT.-BU.OF MINES,PGH.,PA. 26728

THE LIBRARY OF CONGRESS

THE LIBRARY OF CONGRESS

DOBBS BROS. INC.
AUG 83
ST. AUGUSTINE
FLA.
32084

LIBRARY OF CONGRESS
0 002 959 892 7